Editorial

WHILE the pros and cons of Australian broadcasting are current topics, it might not be out of place to mention a few aspects concerning programmes which are badly in need of attention, particularly on the part of some commercial stations.

It is unfortunate that the average broadcaster assumes the public to possess a mental age of about 12 years. It is apparent that at least many features and much material are selected on this assumption. Otherwise, of course, the audience will not be large, and the sponsor won't be happy. That seems to be the reasoning.

As a result, we get some fantastic conceptions of entertainment.

A deluge of serials, particularly low class balderdash of American origin, are for hours on end poured into Aunt Maria's ear in a welter of the emotions. We hear distracted females undergoing various types of permanent mental torment which in fact could only land them in an asylum. Aunt Maria may be soothed and satisfied with such second-hand experiences to compensate for those she imagines she has never had, (if that is important) but thousands of others are given the idea that life really is like that. The human mind simply cannot withstand such a barrage without being persuaded to substitute fanciful unrealities for life as it really is. There may be justification for escapism, but there is also a limit to everything.

In this connection, I heard not long ago a relayed session—"Reflections in a Wineglass"—in which the announcer for about half-an-hour was obliged to read sarcastic comment on the outlook of "amateur" psychologists. The main argument was that a little more of the old fashioned ideas, and less modern tosh, would be better for all concerned in their appreciation of the day's difficulties. Why psychologists should be dismissed as amateurs I don't know, any more than I can appreciate, why the ignorance of the past should be preferred in such an uncompromising fashion to the application of experience gained in the observation of human behaviour.

Then there is the practice of playing in mutilated form snatches of symphonies and other similar works with far more ballyhoo than ever graced a Town Hall concert. I heard recently the broadcast of a concerto, which turned out to be the first movement, followed by the last, but minus one record side to allow the session to finish on the dot. Let me ask the sponsors involved to consider whom they are pleasing by such performances. The listener who doesn't like concertos is bored stiff, and the one who does is irritated beyond endurance. I have even heard an announcer commence such a record a few inches from the start, in order presumably to finish on time.

For heaven's sake, whatever is done in radio, let it be not half done. There is an obligation to conduct a broadcasting station with integrity. This is not the way to do it. It is phoney broadcasting, and we are entitled to be given something better.

John Moyle

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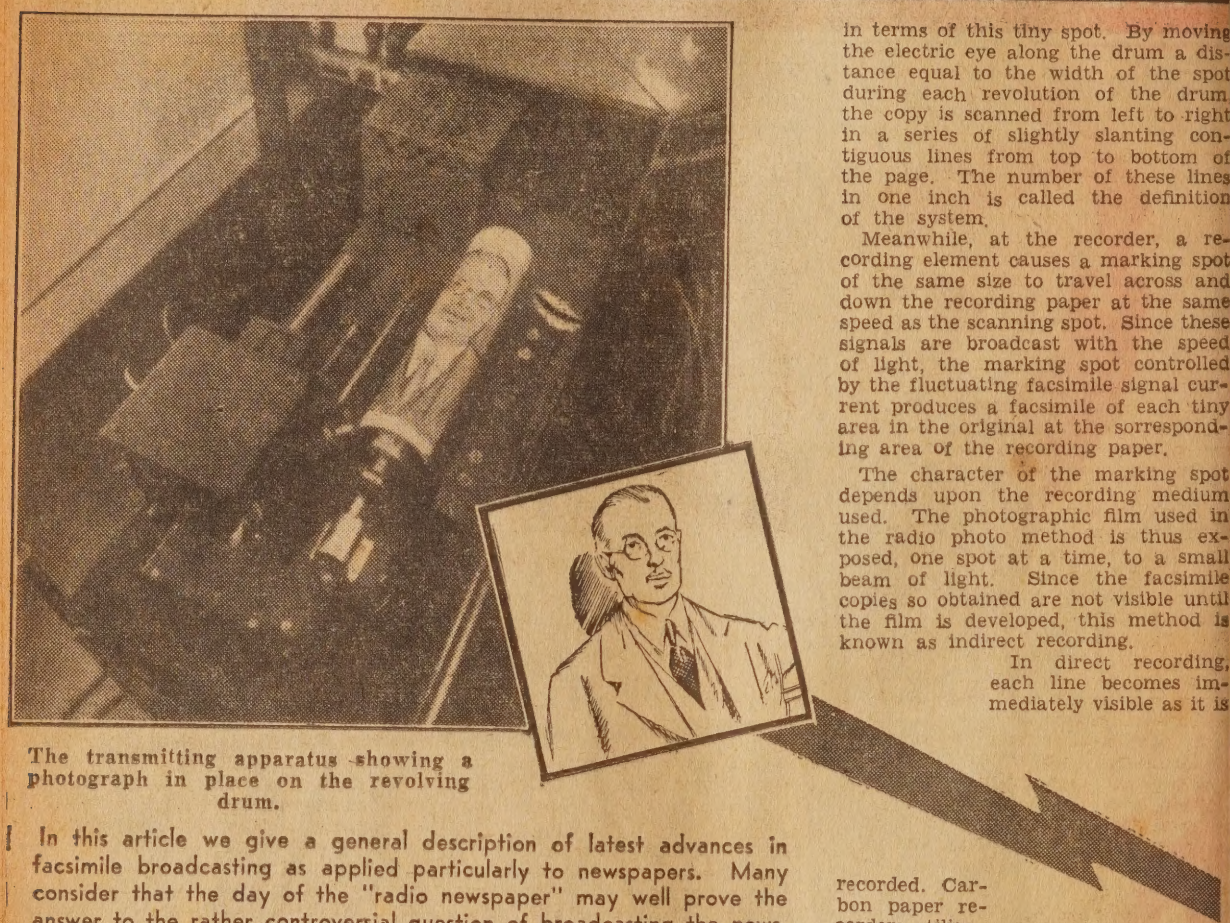
AND NOW — THE AERIAL LIFEBOAT

AIRLINERS of the future may have built into their fuselage one or more passenger cabins that could be jettisoned; the occupants could parachute to earth if trouble develops. The plan was demonstrated last month by Vittoria Isacco, the inventor at Boreham Aerodrome, Chelmsford. Essex, England. These safety "shells"—lifeboats of the air—would be gently lowered to the ground by auto-rotating blades like those used by gyroplanes. The self-contained passenger cabin would be released by the pilot pressing a button, and the rotor blades would start windmilling as soon as the aerial "lifeboat" with four to six people inside, fell clear of the fuselage. The safety idea has been brought close to fruition by the invention of a telescopic metal rotor blade. Our picture shows Italian engineer Vittoria Isacco showing how the telescopic metal rotor blades extend by centrifugal force during descent in lorry tests, similar to actual flight conditions, carried out at Boreham Aerodrome, Chelmsford, on April 15.

FACSIMILE MAY BRING YOUR PAPER



The transmitting apparatus showing a photograph in place on the revolving drum.

In this article we give a general description of latest advances in facsimile broadcasting as applied particularly to newspapers. Many consider that the day of the "radio newspaper" may well prove the answer to the rather controversial question of broadcasting the news, supplying a permanent record with the speed of radio transmission. Our information comes from the G. E. Company of America.

FACSIMILE, like sound broadcasting, is a technique for getting information from here to there, using electric signals as a courier. Like television, it is also a means for broadcasting pictorial information.

But, with facsimile, this information is not transient, the image not fleeting; like printing, facsimile leaves a permanent record of the broadcast programmes which may be enjoyed not only once but again and again.

Any kind of visual material which can be confined to two dimensions can be transmitted and recorded in varying tones of black. Graded tone or black-and-white reproductions may be obtained from maps, pictures, signatures, woodcuts—even colored fabrics and wallpaper designs.

There are many types of facsimile systems, each of which has been developed for specific service requirements. Currently, the best known of these systems is the radio and wire photo service used by newspapers to obtain photographs immediately which would otherwise require days, or at least hours, to obtain by any other method.

Despite this variety, all facsimile systems consist of two basic units, scanner and recorder, together with the transmission link which may be either wire or radio channels, normally used for sound.

In sound broadcasting a microphone is used to convert sound into electric signals and a loudspeaker to convert the signals back into sound again. In facsimile the microphone is replaced by the scanner, and the loudspeaker is replaced by the recorder.

The scanner converts black and each shade of grey to a definite proportional value of direct current.

At the recorder, each value of current produces a mark of the corresponding scanned shade.

Although recorders differ widely, both in method and medium, in the scanner commonly used, copy wrapped around a revolving drum is scanned by an electric eye in terms of gradations of shade contained within a very narrow horizontal line.

To accomplish this, the electric eye is focused upon one tiny rectangular spot so that during one revolution of the drum it scans around the cylinder in terms of this tiny spot. By moving the electric eye along the drum a distance equal to the width of the spot during each revolution of the drum the copy is scanned from left to right in a series of slightly slanting contiguous lines from top to bottom of the page. The number of these lines in one inch is called the definition of the system.

Meanwhile, at the recorder, a recording element causes a marking spot of the same size to travel across and down the recording paper at the same speed as the scanning spot. Since these signals are broadcast with the speed of light, the marking spot controlled by the fluctuating facsimile signal current produces a facsimile of each tiny area in the original at the sorresponding area of the recording paper.

The character of the marking spot depends upon the recording medium used. The photographic film used in the radio photo method is thus exposed, one spot at a time, to a small beam of light. Since the facsimile copies so obtained are not visible until the film is developed, this method is known as indirect recording.

In direct recording, each line becomes immediately visible as it is recorded. Carbon paper recorders utilise a small spot of pressure on carbon paper, varying in intensity with the value of facsimile current so that it leaves more or less of the carbon backing on the recording paper. In the various forms of recording utilising a spot of electrical contact, each value of current flowing through specially treated paper causes an immediate change in color proportional to that value. These systems may be electrothermal or electrolytic in action. The electrothermal recorder utilises a special conducting paper, coated with a light substance which appears to turn grey or black when subjected to varying intensities of heat resulting from corresponding values of current flow through the paper.

The electrolytic recorder is built around an electrolytic action which causes metal from the recording element to be "plated" into specially impregnated white paper, in an amount proportional to the value of current flowing through the paper.

The most obvious means by which the marking spot may be caused to travel across the paper in synchronism with the scanning spot is to replace the electric eye of a scanner with a recording element and to wrap

RIGHT TO YOUR BREAKFAST TABLE

ıe recording paper around a simar, revolving drum. This system is nown as a drum-type page-size reorder and is used extensively in comıercial applications. Since it obviously equires an operator in constant atendance to change the recording aper at the end of each transmission, is impractical for home-broadcasting rogrammes. In addition, even though direct recording medium is used, ıe receiver copy cannot be read ntil it is finally removed from the reording drum.

Another method has therefore been eveloped by which the marking spot is aused to travel across flat recording aper, fed continuously from a roll, etween two recording elements.

Since each recorded line is instantly isible, this is known as the continous, immediately visible recording ystem, developed by Radio Invenions, Inc., an organisation which has een working for the past few years n the development of facsimile broadasting equipment.

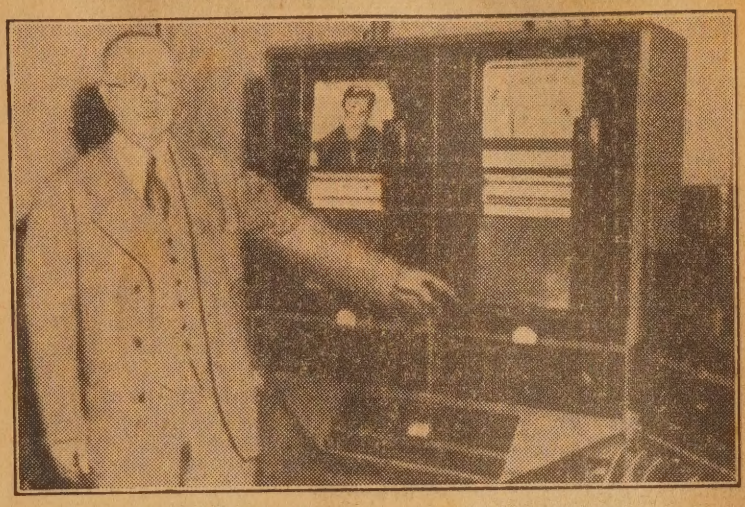
Working with Radio Inventions has een an organisation called Broadasters Faximile Analysis, a group ormed by prominent radio-station xecutives throughout the United tates who were anxious to set up tandardisation procedures in order o be able to produce this equipment.

In the BFA equipment, the area of he marking spot is determined by he intersection of a "helix" (spiral) ire wound around a cylinder on one ide of the aper and a trip of netal (the rinter blade) nounted across the aper on the other ide. By revolving he drum at the ame speed as the canning drum, this angle, of intersection is caused to travel across the aper from left to right once for each evolution of the drum. This type of ecorder is used for both carbon and lectrolytic recording media.

In the carbon paper recorder, the ntire printer blade is controlled by he current so that it exerts more or ess pressure on the carbon and paper ed under it from twin rolls, leaving mark of the desired shade at the nstantaneous area of intersections.

When electrolytic recording paper is ised, the printer blade is stationary—he facsimile signal current flows hrough the paper at the instantaneus point of intersection, causing the lectrolytic action between the paper nd the metal of the printer blade, hich produces a mark of correspondng shade at this point.

For home broadcasting the continuus, immediately visible recorder, is he most practical. The only operaions required of the set owner are he very simple ones of turning the recorder on and off, and tuning to the desired station. No processing is required before the copy becomes legible and, in addition, the home owner may either watch copy as it is being recorded, hot off the air, or may leave the recorder unattended during an entire day without missing his favorite facsimile programme.

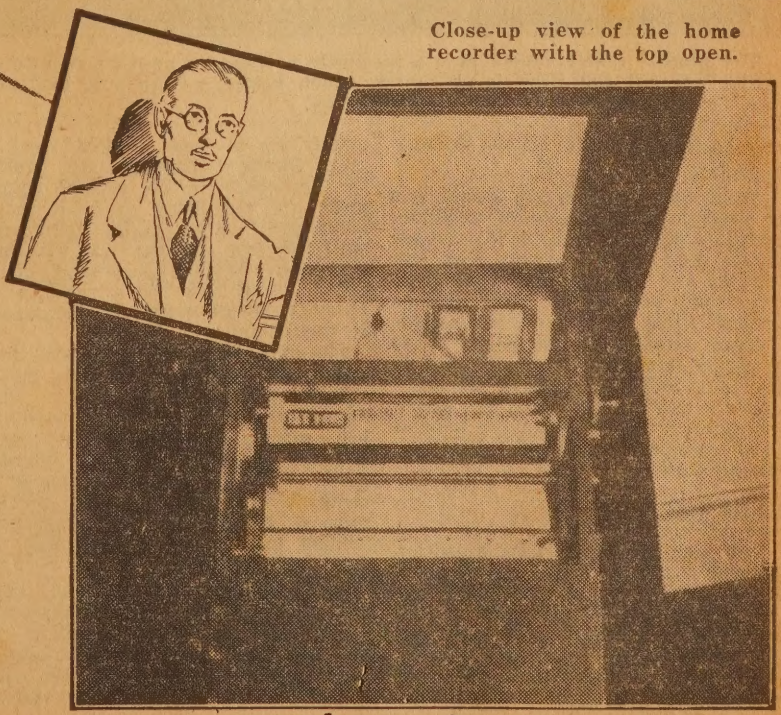


The studio model of the transmitter console.

The primary function of a newspaper is to gather the news of the world, to assemble information and to create entertainment; then to edit from this mass of words and pictures the product offered as today's issue.

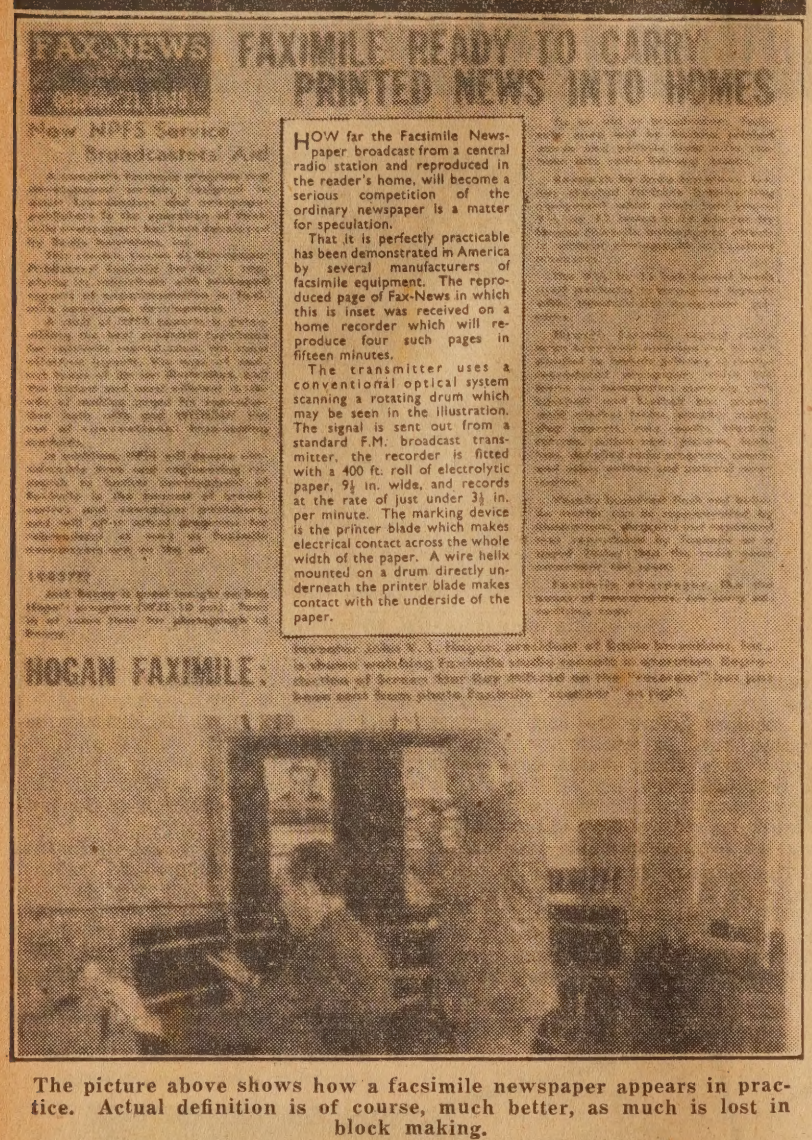
The publisher's necessity of getting the newspaper into the hands of his readers—of spanning the distance between the editorial rooms and the homes of the people of his circulation area—often presents a more expensive problem than the creation of the product itself.

Batteries of linotypes set words into type, engraving equipment is required to prepare pictures for reproduction, printing plates must be cast, before the presses themselves can grind out the editions of the day. But, even this complex manufacturing process



Close-up view of the home recorder with the top open.

PHOTO OF ACTUAL FACSIMILE PAGE


FAXNEWS

FAXIMILE READY TO CARRY PRINTED NEWS INTO HOMES

HOW far the Facsimile Newspaper broadcast from a central radio station and reproduced in the reader's home, will become a serious competition of the ordinary newspaper is a matter for speculation.

That it is perfectly practicable has been demonstrated in America by several manufacturers of facsimile equipment. The reproduced page of Fax-News in which this is inset was received on a home recorder which will reproduce four such pages in fifteen minutes.

The transmitter uses a conventional optical system scanning a rotating drum which may be seen in the illustration. The signal is sent out from a standard F.M. broadcast transmitter, the recorder is fitted with a 400 ft. roll of electrolytic paper, 9½ in. wide, and records at the rate of just under 3½ in. per minute. The marking device is the printer blade which makes electrical contact across the whole width of the paper. A wire helix mounted on a drum directly underneath the printer blade makes contact with the underside of the paper.

HOGAN FAXIMILE

The picture above shows how a facsimile newspaper appears in practice. Actual definition is of course, much better, as much is lost in block making.

only places the papers on the delivery platform.

From there, papers are despatched by every available means of transportation; planes, rail-roads, buses, trucks and even carrier boys on bicycles and on foot are required to put today's news in the hands of subscribers while it is still today's news.

Since facsimile transmission offers a speedy shortcut between the editorial rooms and the homes of the readers, it is small wonder that newspaper publishers are showing intense interest in the equipment that will result from the BFA project.

PAGE SIZE

The page size of the BFA broadcast equipment will be approximately one-fourth the size of the standard newspaper page, and consequently a new technique of writing and editing will necessarily have to be developed. While many newspapermen feel that the Faximile Newspaper must ultimately be at least tabloid size, or even standard eight-column width, the limitations of the present equipment are not likely to deter many publishers in their early experiments with the new medium. It will, undoubtedly, be in its present four-column form that the advantages of Faximile transmission are introduced to the public.

The most important thing that facsimile offers that other printed media cannot approach is immediacy. The first Faximile editions of newspapers will probably, therefore, consist largely of news bulletins of vital interest. These stories will later be expanded to complete coverage, in the regular full-size editions of the newspapers printed in the conventional way in their own plants.

However, experimenters will soon discover that they can programme special editions to reach women at the time of day when they have leisure time to read (perhaps in the mid-morning hours) and Faxpages will be especially prepared to aid them i their daily shopping or meal plannin Advertising will be keyed to th specialised market.

The fact that the late afternoo hours find millions of children wit their ears glued to radio sets for th many audio programmes aimed them will inspire a special editio made up of comics, adventure strip and other printed material, gauge to interest the juvenile reader. Adve tisers will be quick to take advanta of this approach to the vast chi dren's market.

Because of the comparatively sma amount of space available on the fir Faxpages, new layout techniques wi emerge to take full advantage of ever pica of white space. New type face may be designed, new head-writin schemes will be developed, ne methods of preparing copy for trans mission will be tested.

NO SCREEN

The fact that Faximile can repro duce pictures without the coars screen that typifies newspaper repro duction may well bring about a de cided change in the present-day con cept of pictorial journalism. Th advantages of transmitting a pictur across the continent by radiophoto i a matter of minutes have been nulli fied to a great extent because th journey from the newspaper plant t the reader is often a matter o hours. Faximile will change all tha by making it possible to relay a "hot newsphoto to a Faximile set owne immediately.

The challenge presented by thi newly available method of disseminat ing the printed word will be taker up by every progressive publisher, be cause Faximile can print everythin he now prints in his regular editions— in every case faster, and in many cases better.

HIGH SPEED

The content and appearance of th ultimate Faximile Newspaper will de pend upon the close co-operation o the publishers and the men who hav developed the art. Students of th subject can foresee a complete tabloid-size Faxpaper printed in the home o every FM set owner at a speed fa greater than the present standards.

The initial radio publications put out by broadcasters, perhaps relying on pictures, features and other general magazines features even more heavily than on news, may be looked upon by the newspaper fraternity as only a feeble approach toward a facsimile newspaper. But even such beginnings must be recognised as a step toward the ultimate, and it would be unwise to overlook the potentials involved, for the Faximile Newspaper offers the immediacy of radio with the permanence of the newspaper.

1947 EDITION CALL-SIGN BOOK
SEE PAGE 49

Technical Review

RADIO RIDES THE V-2 ROCKETS

As V2 research rockets soar over 60 miles into the ionosphere from White Sands, New Mexico, highly specialised radio equipment sends back a record of more than twenty separate instrument readings.

AS the rockets speed aloft, observers at the control station are presented with data governing the changing temperature and pressure, various characteristics of primary cosmic radiation and properties of the ionosphere generally. The rocket likewise "telemeters" its own behavior—altitude, acceleration, skin temperature and the operation of the control surfaces.

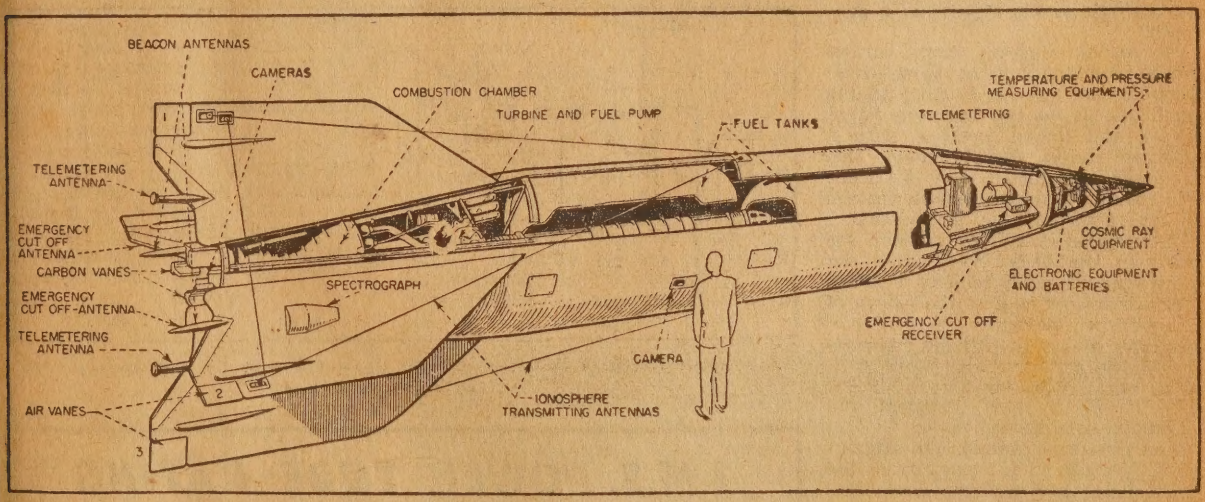
The readings and phenomena to be transmitted are converted into reference voltages, which can be applied to the main transmitter.

A pulse system of transmission is used to obtain high peak power with moderate weight of equipment. The frequency is about 1000 M/cs, which is high enough to penetrate the ionosphere.

The various test voltages are sampled in a pre-determined order and the sampling operation is initiated at regular intervals by a master keyer.

The magnitude of the sampled voltage determines the duration of the corresponding pulse. Then there is a fixed time interval and the transmitter sends out the next sample pulse, again determined by the magnitude of the voltage measurement.

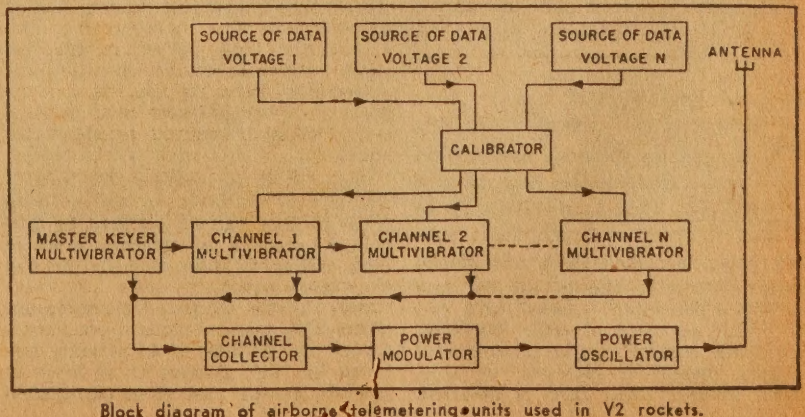
The time intervals are fixed, but the length of individual pulses varies with the actuating voltage, so that the period for the transmission of a complete series of pulses or samples varies accordingly. The time interval between the beginning of each pulse series is arranged to leave adequate time for such variations, the period between the cessation of one pulse train and the next being considerable.



The ground station is contained in a four-wheel trailer drawn by a truck, which carries a 25kw. power generator.

The antenna on the trailer is trained to follow the airborne radiator by both optical and signal-maximising techniques. The detected output from the receiver is suitably amplified and fed into a decoder unit. This recovers the original voltage from the pulse-time modulated signals. The original data is then separated into proper channels, displayed on meters and recorded by various means.

The use of several recording methods guards against the loss of data by breakdown of any one. Principal recording is on a moving strip of photographic paper by a Hathaway magnetic string oscillograph. The meter faces are photographed continuously on 35mm. film, while the output from the video amplifier is recorded simultaneously on film and wire. Timing signals are impressed on all media. ("Electronics," March, 1947.)



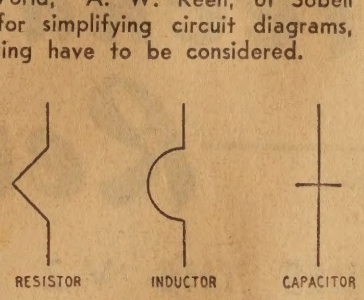
Block diagram of airborne telemetering units used in V2 rockets.

"SHORTHAND" CIRCUITS AND SYMBOLS

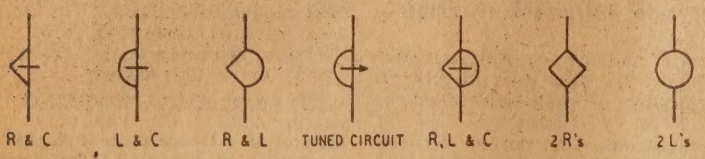
Though long regarded as the shorthand of radio engineers, conventional schematic circuits can become very involved for complicated equipment. Writing in "Wireless World," A. W. Keen, of Sobell Industries Ltd., suggests methods for simplifying circuit diagrams, where speed and time in drawing have to be considered.

HE has avoided introducing new symbols as far as possible, choosing rather to reduce in complexity the existing conventions. He has employed the method over a long period with complete satisfaction.

Symbols for the common components —resistor, inductor and capacitor— have simply been reduced as shown in the diagram. One zig-zag represents a resistor, one loop represents a coil and a single stroke represents a condenser.



"Shortland" symbols for the three basic circuit elements.



Combinations of R, L and C in parallel.

The second diagram shows various parallel combinations of these three circuit properties. A coupled tuning circuit appears as two inductors back-to-back and linked together, with a condenser across one of them. An iron-cored transformer has two similarly coupled inductors with a vertical line drawn through the intersection.

Tappings on a coil or resistor are shown in the usual way, while the centre arm of a potentiometer is shown as an arrowhead against the centre of the resistance element.

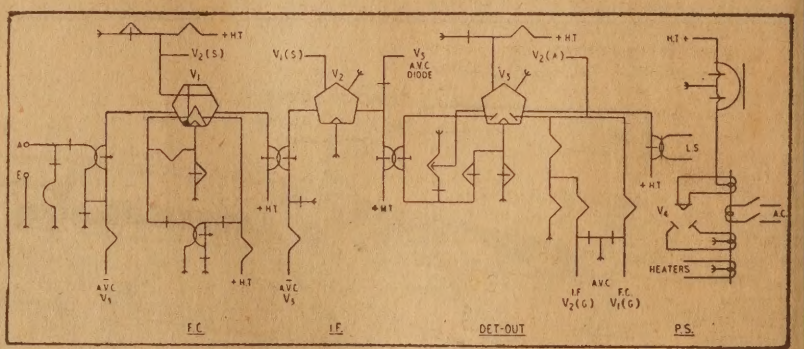
Variable and semi-variable condensers have an arrow or half-arrow symbol on one end of the line, while the other variations show trimmers and electrolytic condensers.

In representing valves, an attempt has been made to get away from the usual collection of dotted or wavy lines within the envelope. Instead, the valves are drawn for the most part as polygons, the number of sides bearing a relationship to the number of electrodes in the valve. The base of the polygon represents the cathode, the remaining sides in a clockwise progression corresponding to the progression of electrodes from plate to cathode. The heater is represented in a more or less conventional fashion, and there are one or two other special symbols for multiple valve types.

Knowing the type of valve depicted and its internal electrode arrangement, it is really no more difficult to follow the polygon figure than the more conventional symbols, especially as the latter are not always arranged correctly in relation to the valve.

The writer does not put forward the idea to outmode present circuit practice, but rather as a simplification which can be used when circuits have to be drawn in a hurry. Apart from the reduction in complexity of symbols, connecting lines are reduced in number and length and the frequent cluster of lines around the valves can often be reduced.

To illustrate these points, he shows the circuit of a complete four-valve broadcast receiver, following the suggested technique. Even without reading the explanatory text in full, a radio engineer could follow most of the circuit without undue difficulty. The simplification is particularly apparent in the high tension supply circuit.



A complete four-valve broadcast superhet circuit drawn by the methods suggested by A. W. Keen.

FLAW DETECTOR

ADJUSTABLE voltage passing through an electrode assembly in the new General Electric flaw detector will pick out flaws in materials up to 0.025in. thickness. Paper, sheet rubber, mica, varnished cloth, and plastic materials can be checked at the rate of 450ft. per min. Coated wire can be tested at speed of 100ft. per min. Electronic control may be set to sound alarm, operate a recorder, or shut down process when flaw is detected.

I.M.S. POWER TUBE RATING

A NEW type of valve rating has been announced by RCA for certain specialised valve types.

IMS stands for Intermittent Mobile Service, which is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements, even though the average life expectancy of tubes used in such transmitters is reduced to about 100 hours.

Such use of tubes under IMS ratings, which are considerably higher than ICAS ratings, can be justified as economical practice in applications where high power is intermittently desired from small tubes.

IMS ratings are based on operation where the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of five minutes followed by "off" periods of at least five minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

The first valve to carry this rating is the 3E22—a small push-pull beam transmitting tube intended for intermittent mobile service in aircraft and other applications. Its IMS ratings allow the use of a maximum plate input of 100 watts in class C telegraph operation.

The 3E22 has a balanced and compact structure of the beam units, excellent internal shielding, close electrode spacing, and short internal leads. The high efficiency and exceptional power sensitivity of the 3E22 permit its operation with very low driving power. With the units in push-pull arrangement, the 3E22 can deliver approximately 72 watts in class C telegraph service with a driving power at the tube of only 0.45 watt.

NEW SYSTEM IN ENGLAND

A new television system in which, in place of the two separate transmissions, one of sound and one carrying the visual image, only one wavelength is used, was shown in the Radio group at the British Industries Fair, in May. Known as "Videosonic" television, the recurrent "fly back" period (equivalent to the dark interval between successive cinematograph images) is used to accommodate the sound signal.

THE exhibit featured a full-scale working Outside Broadcast television van: the output of a television camera of the firm's own manufacture, trained on an enlarged photograph, is passed through the Outside Broadcast van which this exhibitor also makes.

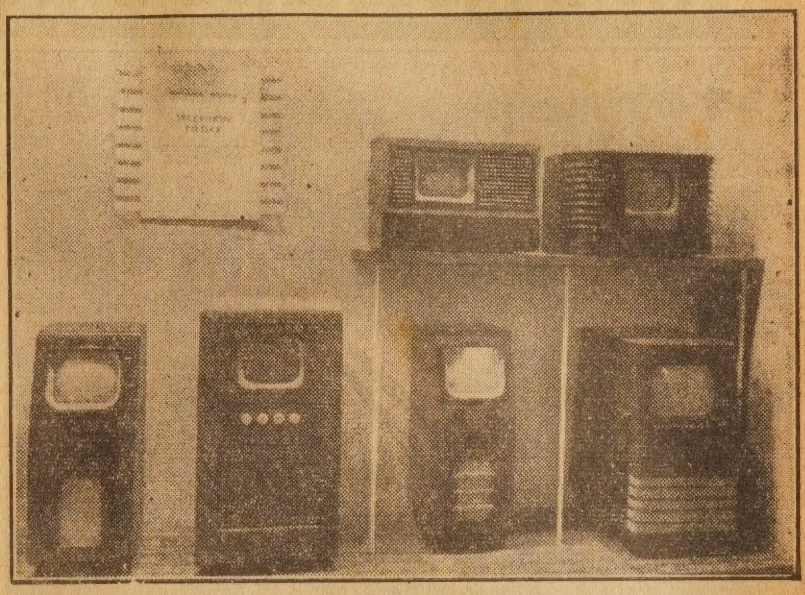
The sound system of one radiogram is the result of several years' teamwork by a number of radio and electro-acoustic engineers; their assignment was to incorporate in their design all the most recent advances in quality reproduction—irrespective of cost. In addition to the normal radio and automatic record-changing equipment, a machine for recording one's own records is incorporated: but throughout, the emphasis is on quality of reproduction rather than on "gadgets."

CONTROLS

For example, in place of the normal single knob for tone control, the output is divided between five over-lapping sound frequency ranges, each of which can be separately adjusted from a special lever-control unit: the output from these goes to three separate speaker units: a powerful auditorium loudspeaker for the bass notes, a metal diaphram unit in a multicellular horn structure for the middle register and treble ranges, and a special electrostatic unit for the upper treble register.

These and many other special controls are recessed under lids, only the basic controls being normally exposed. Thus the instrument does not have to be "mastered" before it can be operated—but as the user gradually learns the various controls he realises that the complexity goes not to make a freak instrument, but to allow the reproduced sound to be adjusted more closely to the original than has ever hitherto been possible.

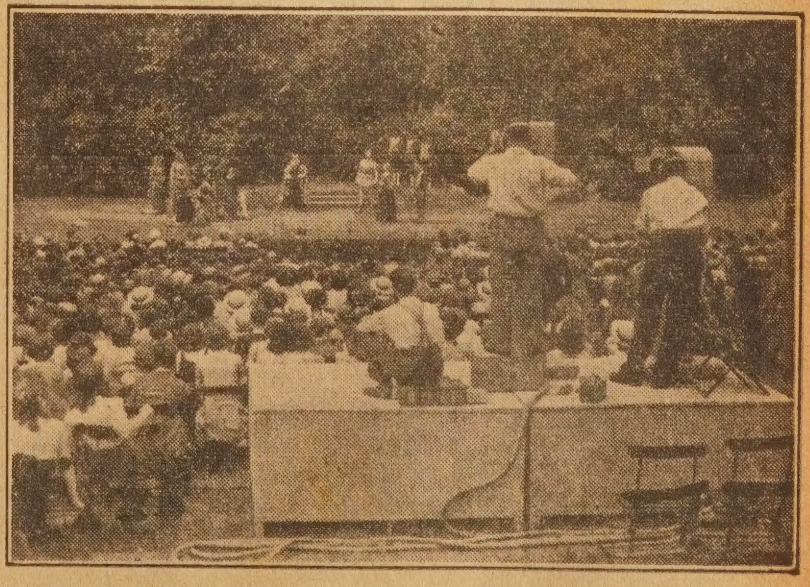
Unsightly knobs and dials are eliminated in another radio receiver made in the form of a globe: tuning is effective by revolving the globe, and the controls are fitted as sleeves on the tubular stand.



In England, television services are continuing on much the same lines as before the war. This picture shows the type of receiver which may be bought, ranging from the comparatively small table models to the more elaborate "floor" consoles. Technically the results are quite good, main problems being those of programmes and high cost of equipment and service.

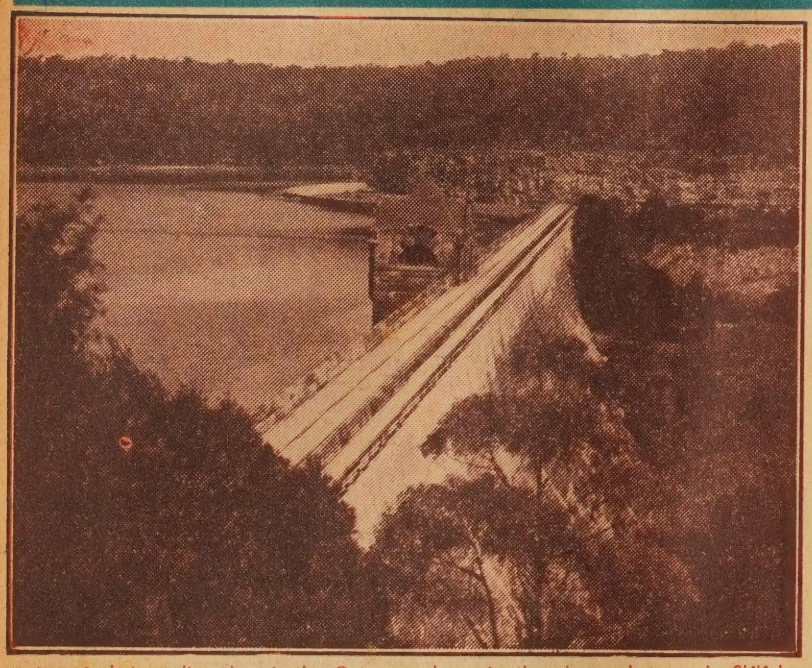
Another exhibitor showed a frequency-modulated transmitter for use by police, fire services, &c. Use of frequency modulation ensures a lower interference level than has heretofore been possible with equipment of this type. The same firm offered a new type of Army communications receiver which is supertropicalised: designed for use in tropical conditions where bad travelling conditions are to be expected; this unique set will even work under water.

Developed during the war to enable thousands of comparatively unskilled operatives to undertake intricate soldering operations in vital radio apparatus, Britain is the only maker of a wire almost as fine as a hair, yet containing three cores of flux. Now being exported to 38 countries, this wire will assist in the assembly, in local factories all over the world, of the many million radio components which Britain is now exporting.



In Regent's Park open-air cinema, a direct televised broadcast is here being carried out of Shakespeare's "A Midsummer Night's Dream." The latest equipment has no difficulty in coping with the problems of outdoor and indoor lighting, even under adverse conditions.

WATER SUPPLY VITAL TO COMMUNITY



A typical Australian dam is the Cataract, shown in the above photograph. Skilful use of natural geography allows vast quantities of water to be held by a minimum of engineering.

Water is the most universal of all fluids and the one without which life, both animal and plant would be non-existant. It is found in enormous quantities throughout Nature in three distinct forms, liquid, solid and gaseous.

THE study of water can never be a "dry" subject because, as every one knows, water is wet. I can't tell you why it is wet but there it is, these things happen.

People are as dependent on water as are all other natural subjects, for our bodies consist of about seven-eighths water, distributed in various percentages. Our body proper is about 62 per cent. water, while the grey matter of the brain is about 85 per cent. Those people with water on t brain, of course, have a greater pe centage.

When you hear of someone with "mind like a jellyfish," you can inte pret the insult in two ways. Eith it is meant to infer that you ha no mind at all, or that your bra is 99 per cent. water, for this is e actly the water content of a jell fish. As a normal person's grey matt is 85 per cent. water, it is at on apparent that we are very close to t border line all the time.

About nine-tenths of all vegetab life is water. Water also covers abo three-quarters of the face of t earth. It constitutes approximate 0.2 per cent. of the volume of t earth, so that if the earth was pe fectly smooth, there would be enou water to cover it to a uniform dept of 2¼ miles, the total weight bei about 12 to the power 1014 tons. Wo this out for yourself as I only hav half a ream of paper at hand.

A 48-inch main passing through a tunnel cut in solid rock. This tunnel is necessary to carry the pipe line through a hill.

INCOMPRESSIBLE

Water has some peculiar characte istics. It is almost incompressibl This means that a pint pot will onl hold a pint. One can't squeeze th water or stamp it down to get le than a pint. This also applies t other liquids commonly supplied i pint pots.

Water boils at 212 degrees Fahren heit in an open container, and n matter how hot the flame is, the tem perature of the water remains at 21 degrees. The temperature can be rais ed only under pressure, which propert is made use of in the new pressur cookers now on the market.

As the temperature of water i lowered, there is a slight shrinkag until a temperature of 39.2 degree Fahr. is reached. It then begins t expand until at 32 degrees Fahr. i freezes into ice which then is on eleventh greater in volume than th original water.

When heat is applied to ice, ther is no rise in temperature until it ha been melted into water. In order t melt one ounce of ice (but not enoug to raise the temperature), enough hea is used to raise one ounce of wate from freezing point to a temperatur of 175 degrees Fahr. The reason fo this is that all the heat is used t turn the ice into water.

COMPOSITION

Perhaps I should have commence this article with details of the com position of water, but I purposely lef this until this stage because I wan to mention heavy water, a substanc which is in the news in connection wit atomic power.

Water consists of two gases, hydro gen and oxygen, in the proportion o two parts of hydrogen to one part o oxygen—hence the chemical formul

ENGINEERING ON A VAST PROGRAMME

by Calvin Walters

H2O. This water is known as the hydrol variety, and is that found commonly in Nature. But there are three kinds of hydrogen and three kinds of oxygen, and from these it is possible to have enough different combinations of these six gases to make 18 different kinds of water.

Ordinary hydrogen is known as single mass hydrogen. But there is also a double mass or heavy hydrogen whose atom weighs twice as much as the atom in single mass hydrogen. Now if you took two parts of this heavy hydrogen and one part of oxygen, you would still have water. But the molecules of this water would be heavier than the molecules of ordinary water because of the heavier hydrogen atom. This is known as heavy water, or dihydrol.

HEAVY WATER

Heavy water freezes at approximately 39 degrees Fahr. (ordinary water 32 deg.), and boils at approx. 215 degrees Fah. (ordinary water 212 deg.). Heavy water is poisonous to seeds, tadpoles and flatworms, but does not appear to be harmful to man when drunk (meaning, of course, when man drinks heavy water). A gallon of ordinary water weighs 160 ounces, while a gallon of heavy water weighs 175 ounces.

This heavy water appears to have no use outside of science, and is used in experiments with atomic power.

As mentioned before, the chemical formula of ordinary water is H2O. Now if one adds one extra atom of oxygen to make the formula read H2O2, lo and behold we have hydrogen peroxide. Nature is very touchy about these atoms. Add one atom here, take away one there, and things happen, sometimes with great violence. It is interesting to note that in the example of hydrogen peroxide it produces blondes. Whether this constitutes violence depends on points of view.

HOUSEHOLD SUPPLY

Enough has now been said about the nature of water to allow me to get on with my main topic, namely, how water gets into our household supply.

The problem of the distribution of a pure water supply has exercised the minds of authorities and public wherever there is a permanent settlement of people, for, without this supply, there can be no settlement, and the health of the community suffers.

As an example of the methods used in most parts of the civilised world and of the problems involved, one can do no better than to quote in simple detail the water supply of Sydney and its environs.

In the early days of settlement, the water supply to Sydney was taken from a "run of fresh water which stole silently through a very thick wood." This stream had its source in spongy swamps which lay about King and Park streets. The stream ran from there to what is now known as Circular Quay.

In 1791 an 8000-gallon tank was excavated in the bed of the stream, and this gave rise to the name Tank Stream. Water was also taken from a "particularly copious stream running into Blackwattle Swamp," and a permanent spring discharging into Rushcutters Bay.

In 1824 a John Busby suggested the construction of a tunnel from Lachlan Swamp (in Centennial Park) to Hyde Park, where a reservoir was to be built. Convict labor did the job in 10 years, and what was known as "Busby's Bore" passed through the back of the Showground under Victoria Barracks and Oxford-street to Hyde Park. The reservoir was not built, but the water was distributed by carts. Later, pipes were laid in the principal streets. Houses were connected by pipes by February, 1844. Busby's Bore still exists, and a three-inch pipe feeds the ponds in the Botanic Gardens. This is the only purpose now of Busby's Bore.

With the increase in population to 50,000 in 1852, greater water supplies were needed, and attention was paid to the Botany Swamps. Dams were built under great difficulties, and in 1857 the dams were finished. Some of these still remain and are only used by the woolscouring and other industries.

PUMPING STATIONS

A pumping station was built at Botany, and the water pumped through a 30-inch cast-iron main to the Crown-street reservoir of 3½ million gallons and the Paddington reservoir of 1½ million gallons.

Continued increase in population and recurring dry years made it necessary to look further afield.

It is desirable in any water supply scheme that the source of water should be some area well away from populated areas in order to minimise or eliminate the possibility of pollution. Thus it is that rivers as a source of supply are obviously greatly favored.

Many countries, such as America and Europe, are well favored in this respect, but Australia is unfortunate in not having any great rivers with a constant flow. It is therefore necessary to rely on dams built across gorges and valleys in which the comparatively meagre flow of water can be conserved.

In the case of Sydney, the first scheme of any magnitude was that of the Upper Nepean River and its tributaries, the Avon, Cordeaux and Cataract rivers. These rivers are some miles from the main city centre.

The scheme was commenced in 1877 and completed about 1888. With a total catchment area of 347 square miles the area is unoccupied in the main, what few settlers there are coming under a measure of control. The country is rugged sandstone with a friable soil which assists in the filtration of rainwater falling on the surface. At the head of some of the rivers are great swamps with a sandy bottom which, as well as acting as filters, keep the streams fed long after the cessation of rain.

The dams constructed across the rivers provide a storage of a total of 106,391 million gallons.

The first dam to be constructed was the Cataract Dam. This impounds 20,743 million gallons, and at full supply level, the surface area is 2104 acres and the water extends twelve miles up the river and six miles along a subsidiary creek. The height of the dam wall is 150 feet. The largest reservoir, the Avon Dam, impounds 47,153 million gallons with a wall 210 feet high.

WATER CLEANING

The methods used to get the water from the dams to the area to be served varies somewhat in different countries, according to the character of the country through which it has to pass. Where the country is comparatively uninhabited, it is unnecessary to treat the water in any other way than by screening in order to remove leaves and such other debris which may get into the water en route. Where there is any possibility of other more serious pollution, chlorination must be used. This takes the form of the introduction of chlorine in liquid form being pumped into the water in controlled quantities. Other methods are the use of sand filters, through which the water flows either by pumping or by gravity. After a time, marine growths form on the surface of the sand and these trap any bacteria that may be in the water.

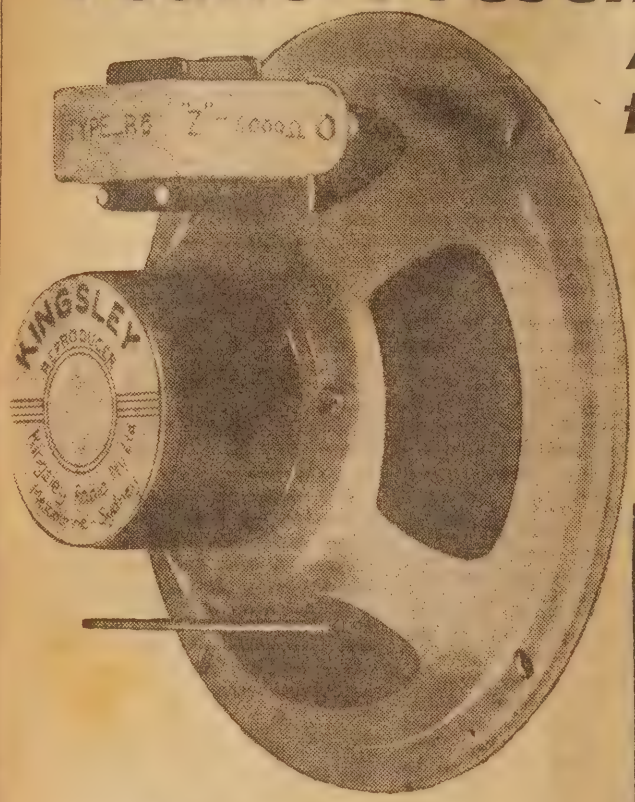
Sydney is fortunate, inasmuch as no treatment of water is necessary, except by screening, and the water in the taps is exactly the same as it comes from the source of supply many miles away.

TUNNELLING

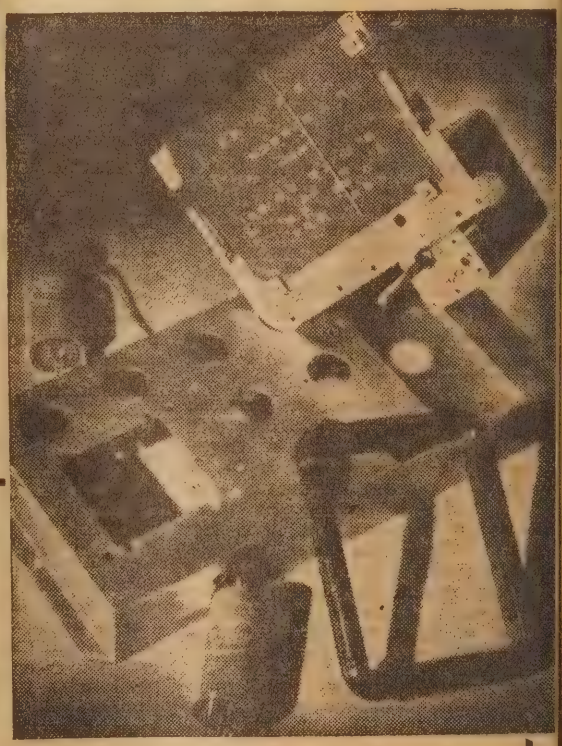
From the various dams and weirs constructed across the rivers the water is led through a tunnel four and a half miles in length, dug through a hill separating the Cordeaux and Cataract rivers. From here the water is led through a system of canals, pipes, and aqueducts for a distance of

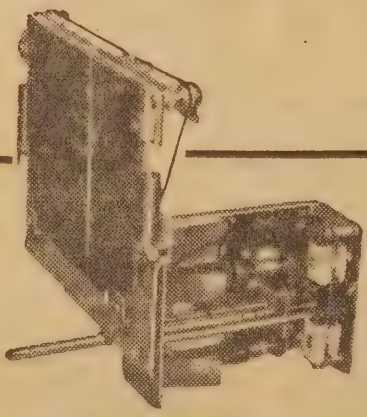
Vealls Present....

A new addition to the Kingsley Range



The Kingsley 6" Permanent magnet Speaker has an Alnico magnet—the sensational new alloy that makes a 6" speaker give the tone and volume of larger speakers. Cadmium plated, this Kingsley speaker is dustproofed to prevent fine particles reaching the voice coil. The matching transformer is wound on a moulded bobbin to ensure perfect insulation, and the sturdy mounting bracket allows the Kingsley speaker to be mounted direct to the chassis in mantel models. Alternatively the bracket may be adapted to carry a filter choke for mounting in consoles.





"KINGSLEY" KITS

FERROTUNE GANGLESS FOUNDATION KITS.
PERMACLAD COMPONENTS.

The research and developments of the war have been applied to this new receiver. Entirely new in conception and design, it is a revolutionary step forward in radio. Before you decide on ANY kit, see the permeability-tuned Kingsley Kits.

Model K.F.T.1. 5 valve A.C. (comprising:—Gangless tuning unit, dial, I.F.'s and chassis) Console or Table models.

Model K.F.T.2. 3 valve Reinartz (comprising:—Gangless tuning unit, dial and chassis) Small Mantel model.
Model K.F.T.3. 4 valve A.C. (comprising:—Gangless tuning unit, dial, I.F.'s and chassis) Small Mantel model.
Mantel Cabinets available to suit the above kits.

VEALLS

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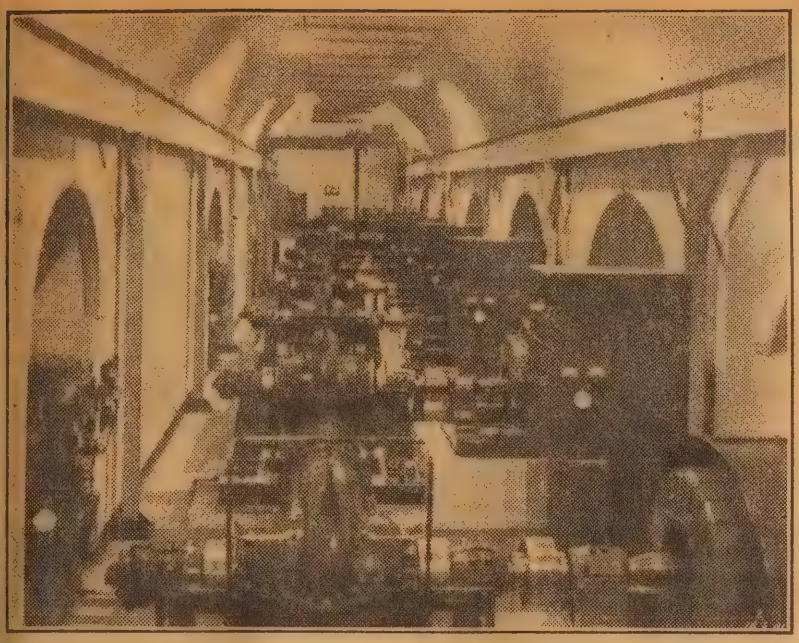

An underground pumping station located some hundreds of feet below ground surface is just part of the days work for the engineer.

40 miles to Prospect Reservoir. This reservoir is formed by an earthen embankment across Prospect Creek 7300 feet long. It has now become merely a service reservoir capable of keeping the supply going during any temporary interruption to the supply from the various dams.

From Prospect Reservoir the water is taken through a valve and meter by a canal five miles long. This canal has a fall of only six inches per mile, but delivers 93,000,000 gallons per day.

The canal delivers the water to Pipe Head. This is really the starting point of the reticulation system, and here the actual screening of the water takes place. This is done in screening chambers 250 feet long and 40 feet wide. Each chamber has a central channel 12 feet wide, on each side of which is fixed a phosphor-bronze mesh with 625 meshes to the square inch. This screens the water which passes through into the outer chamber and thence into the pipes. As previously mentioned, this is the only treatment given to Sydney water with the exception of the small amount coming at present from the new dam at Warragamba. This water is chlorinated, owing to the proximity of settled areas.

The Sydney water supply is acknowledged to be one of the purest in the world. Constant supervision is exercised and samples are taken at frequent intervals from selected points and tested both chemically and bacteriologically, so that there is little danger of contamination.

SYDNEY'S RESERVOIRS

The mains from Pipe Head are three in number and lead into two reservoirs at Potts Hill, near Sydney. These two reservoirs are of 175 million and 96 million gallons respectively. They serve to supply Sydney during any interruption in the supply from Prospect and to prevent variation in pressure.

From Potts Hill the water is conveyed to the city proper by way of 4ft. mains, whilst other mains branch off to various suburbs. From Potts Hill there is a tunnel 10 miles in length, running to Waterloo. This is a pressure tunnel and is a single steel tube 8ft. 3in. in diameter, encased in concrete, bitumen lined and surrounded by rock. Large-sized mains are connected to this tunnel at various points, and feed the southern side of the Harbor.

There are five major pumping stations located at various points. These raise about 416,131 tons of water daily to various heights into reservoirs which feed every part of the metropolitan area.

The pressure in the mains is an average of 50 pounds per square inch. There are approx. 4583 miles of water mains in use.

STORAGE CAPACITY

The total storage in the dams is at present 106,391 million gallons. When the new dam is completed on the Warragamba River the storage will be augmented by 455,000 million gallons. This dam will have a wall 360 feet high and will be the highest structure of its kind in the Southern Hemisphere. Sydney will then never again be short of water.

It is interesting to note that, on account of climatic variations and the absence of large rivers, Sydney needs a larger storage capacity than any other city in the world. Melbourne is in a more favored position with a storage capacity of 40,000 million gallons. Yet Sydney, with a storage capacity of a little over 100,000 million gallons, strikes more trouble.

It will thus be seen that when we turn the tap for water we are dependent on a system which has behind it a vast amount of research and capital outlay, years of labor, and an enor amount of money.

Through overland pipe lines travels the water supply for a city.

Re-valve your Service Jobs with PHILIPS

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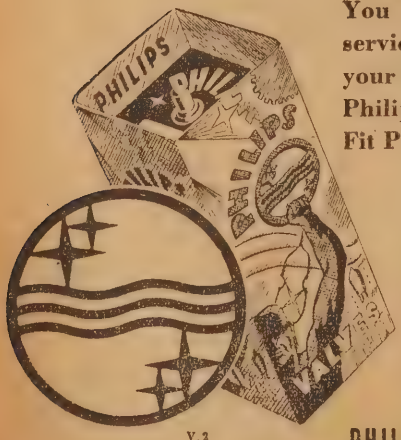
More Business



V.2.

You build Goodwill for your business when you fit Philips valves into service jobs. Your customers look to you for the best. They depend on your judgment as well as your workmanship. Throughout the world Philips lead in the field of electronics—you can lead in your line, too Fit Philips valves—you'll find it's good business.

PHILIPS
VALVES

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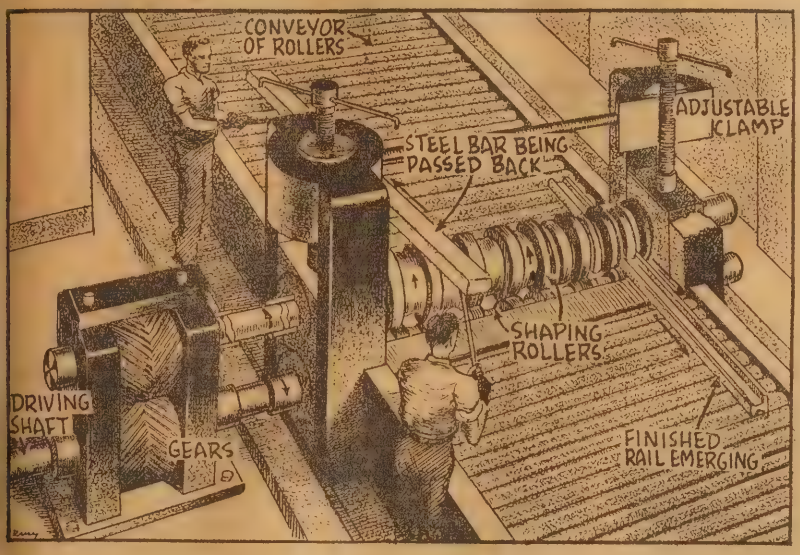
Sydney . . Melbourne . . Adelaide . . Perth . . Brisban

HOW IT WORKS — MAKING STEEL RAILS



Rolling mills have become of the greatest importance in connection with the manufacture of cheap steels, having produced a specialised and subdivided industry.

SOME rolling mills turn out semi-finished products — "blooms," labs, billets and bars—which are in urn worked up elsewhere. Other mills nake finished steel products, such as ods, bands, railway lines, plates, wheels nd axles.

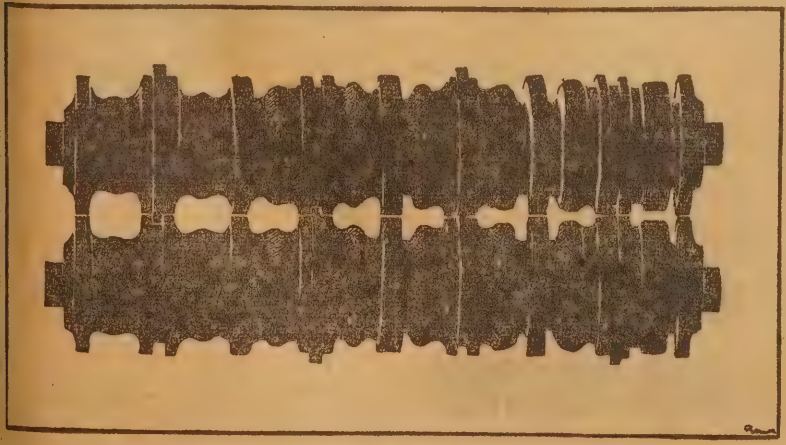
The steel ingot is first reduced in a looming mill. Streams of water keep he rollers cool as the ingot is squeezed etween the movable upper roller and he fixed lower roller. At first the ollers are set almost the thickness f the ingot apart. Then, as the ingot asses back and forth, the distance s lessened, until the ingot is reduced nough in thickness to go into the ail-rolling mill, or other type of mill. The process of rail-making is very pectacular, as red-hot billets come rom the blooming mill and are squeezed down in size to the finished rail.

As seen in the sketch here, the solid but flexible steel is shaped in the finishing mills, passing through shaping rollers, which give it the required cross-section.

The rollers between which it passes successively are shown in detail in the second sketch.

Starting as a bar, the steel billet finally emerges as a long, writhing snake of glowing metal, to be sawn into rail lengths.

After the rails leave the saws, they go to a cooling bed, where they remain until they have become cold. They are then taken to powerful presses, which straighten out any bends or minor kinks that may have developed as they are tossed about while red-hot.



A sectional sketch of the rollers used to form steel rails.

ELECTROSTATIC PAINTING

ELECTROSTATIC spraying, widely used during the war for rapid application of paint finishes on small parts, is now increasingly used for larger units.

The success achieved is represented by comparative figures. With ordinary spraying, 60 gallons of paint was required to coat about 500 panels. After adopting the electrostatic spraying method, the same quantity of paint would suffice for 944 panels. An overall saving of more than one third was reported in the quantities of mixed paint used.

Labor costs have gone down, too. Whereas 21 men were needed to operate the previous system, the present force consists of only eight men, turning out 25 per cent. more production. Floor space needed for the present system is one third less than that previously required.

NEW SPRING MATERIALS

DEVELOPED for use in mainsprings of watches, a new alloy is a cobalt-base product, containing 40 per cent. cobalt, 20 chromium, 15.5 nickel, 15 iron, 7 molybdenum, 2 manganese, 0.15 carbon, and 0.03 berryllium. Tests have shown watch springs made of this alloy, called Elgiloy, to have several times the life of ordinary carbon steel mainsprings, not only because of greater strength and resistance to "set," but also because of its exceptional corrosion resistance. They are for all practical purposes unattacked by even corrosive atmospheres — atmospheres that "eat up" a carbon steel spring in a matter of months.

The new alloy is surprisingly easy to fabricate, either hot or cold, and does not require quench-and-temper heat treatment as does carbon steel. The Elgin National Watch Company, who developed the material, have used it in mainsprings for nearly a year without a single failure.

HOUSES BY CATALOGUE

PREFABRICATED houses that can be ordered, complete from color schemes to furniture, from illustrated catalogues are the dream of Walter Teague, American architect and designer. To this end, Teague has designed a 24 x 32ft. house, 1000 of which were on order when the war came.

Now refined, the flat-roofed structure is of stressed plywood panels, 4 x 8ft. for walls, 4 x 12ft. for floors and ceiling, both 4in. thick. Roof panels have a 1ft. eave. Kitchen panel has kitchen fixtures attached to one face, bath and heating fixtures to the other. Bathroom fixtures are of moulded plastic.

PROVING THEIR WORTH
wherever they're used

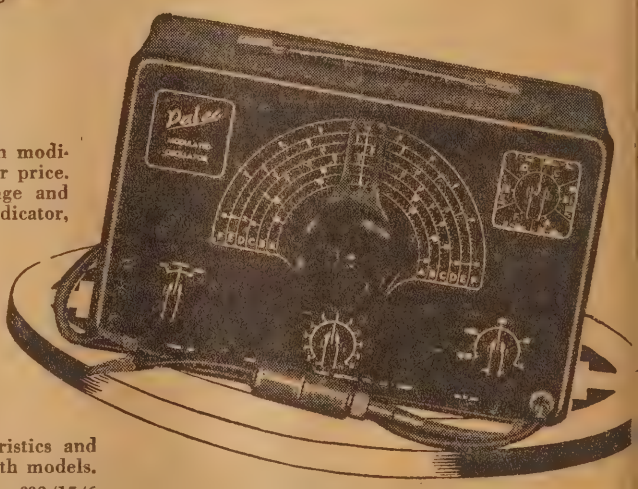
Palec Signal Generator Model S.G.1.

The performance of this instrument under gruelling factory conditions has been closely watched over the last 12 months. It has more than proved its worth and compares favourably with instruments of world-wide reputation selling at considerably higher prices.

While Model S.G.1 was intended to cater for better class service fields, its suitability as a factory production unit is indicated by the fact that at least 16 major Australian radio factories have one or more in service giving every satisfaction. One well-known firm originally installed six S.G.1's and have since increased this to 30 for use solely within their organisation.

You are invited to write or call for full specifications and details.

Price — Model S.G.1 ..... £54



Palec Modulated Oscillator Model M.O.

Model M.O. is virtually the S.G.1 with design modifications enabling it to be marketed at a lower price. E.g., in place of an expensive V.T.V.M. stage and meter necessary in S.G.1 as a reference level indicator, a simple automatic amplitude control system is substituted which holds the input voltage to the attenuator reasonably constant on all bands. Again, variable modulation percentage, not essential in service work, is replaced by fixed (30%) modulation.

The modifications in no way affect the fundamental operation of the instrument as a high-grade service oscillator. The same frequency coverage, attenuator characteristics and low minimum leakage, etc., are common to both models.

Price — Model M.O. £32/17/6
External Vibrator Unit to operate any Palec A.C. instrument from 6-volt battery £4/17/6

Note:—Full and comprehensive instruction books supplied with all models. Write for specifications.

All prices subject to tax, and to variation without notice.

Available from leading wholesalers, all States.

Palec

Paton *Electrical* PTY. LTD.

Manufacturers of all Types of Radio & Electrical Test Equipment & Meters.

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P17FP

NEWS AND VIEWS OF THE MONTH

COUNTRY RADIO

A WEEK spent in the country for the first time in recent years underlined very definitely the improved lot of the countryman and his radio.

In the old days, as soon as the immediate precincts of the major towns were left behind, battery sets were the order of the day. Now, however, the electric power has thrust its network of wires further and further inland, and a surprising number of farmers and graziers have their lives revolutionised with its aid.

Apart from radio, the number of electrical devices round the modern country home would in many cases exceed those of the average city dweller. In one home I saw there were electric refrigerator, water heaters for the bathroom and kitchen, electric cooking stove, electric egg-beater and cake-mixer, electric motors for chaff-cutting, &c., in addition to the use of power for radio, heating and lighting. And in an elaborate engine-room, a home-lighting plant which previously cost £800 was for sale!

VIBRATOR SETS

One could not but be impressed by the popularity of the vibrator type of receiver where batteries were essential. In some cases battery charging is a bit of a problem, but somehow or other those concerned seem to get over it. In the towns, the local radio men do a roaring trade in selling and charging batteries. In one town well out west, it is reported that a dealer does nothing else but sell accumulators, his turnover running to fantastic figures.

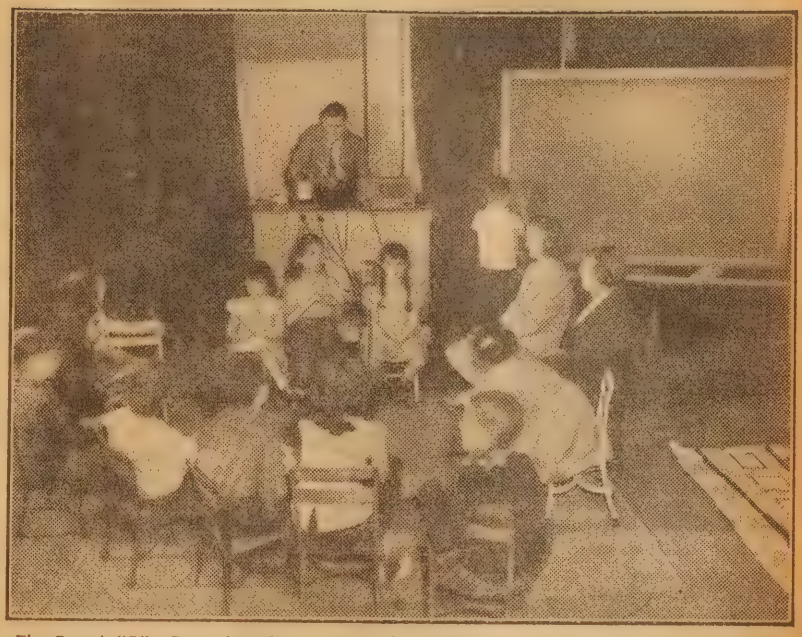
The radio reception some of these country people experience is amazing. The low noise level has much to do with it, of course. At night, under good conditions, a station hundreds of miles away can often give better service than the local broadcaster.

All this is as it should be. The country man has every right to demand living conditions as near those of the remainder of the community as circumstances will allow. And at the same time, he has quite a few advantages which the city dweller will never know.

W.I.A. CRITICISM

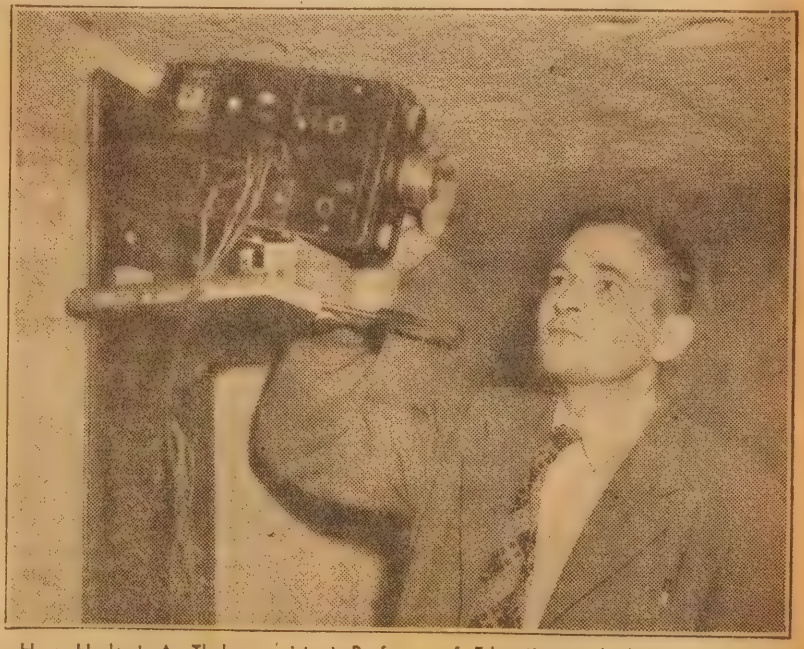
OUR recent criticism of the WIA Convention and its lack of results in connection with a Federal constitution appears to have struck sympathetic chords in a number of places. Apparently we are not alone in recognising the absurdity of six divisions all agreeing to make uniform their individual set of rules, but refusing to bind themselves together into one united whole.

There is, however, one point we wish to make clear, as there may be danger of it being misunderstood. Because we are critical of th WIA, or any other

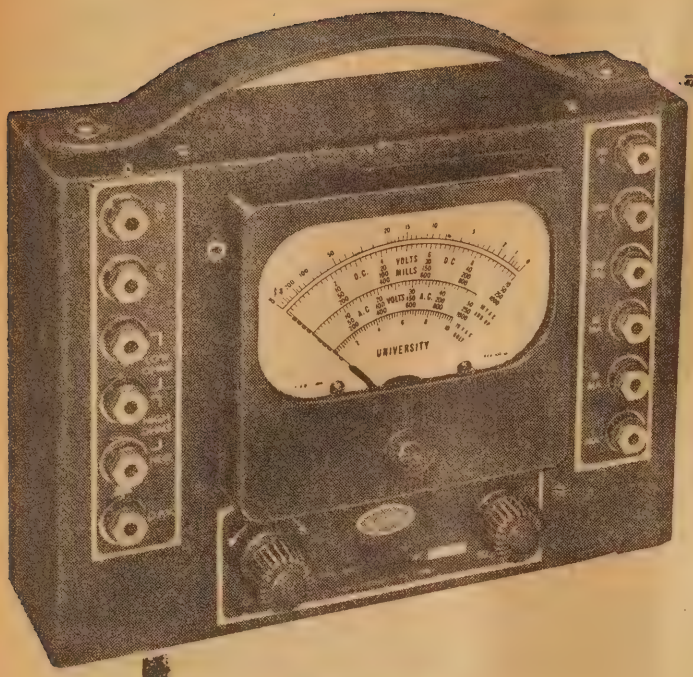


The Fourth "R"—Recording for research—has been added to the Experimental School to study teaching methods. A classroom laboratory has been equipped to make sound pictures of young students during their study periods, without their knowledge. The record thus made provides the data for educational research aimed at improving teacher-pupil relationship. Here, while the seven-year-olds are shown discussing the production of a play about Cinderella, their voices and behaviour are recorded. Professor Herbert A. Thelen, designer of the Laboratory, monitors the voice recorder. In an observation gallery, a 35mm motion picture camera, focused on the class, automatically makes a picture every 15 seconds.

SPECIAL CAMERA FOR CLASS-ROOM STUDY



Here Herbert A. Thelen, assistant Professor of Education and designer of the Laboratory, adjusts the lens of the camera used to make photographic records of the classroom sessions.



UNIVERSITY'S MULTIMETER KIT

(MODEL MKI)

Easily constructed with a few simple tools, the new MKI uses the popular four-inch square meter with clear multi-scale. Featuring extensive ranges, the finished instrument compares more than favorably with commercial models. Selected components insure a high order of accuracy.

It comes complete with full wiring and constructional details, circuit diagrams and photographs make assembly easy.

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DC volts: 0/10, 0/50, 0/250, 0/1000.
AC volts: 0/10, 0/50, 0/250, 0/1000.
Output volts: 0/10, 0/50, 0/250, 0/1000.
DC m.a.: 0/1, 0/10, 0/50, 0/250.
Ohms: 0/1000, 0/100,000.

The 0/1000 ohm range is particularly helpful in checking open circuits and short circuits in coils and I.F.'s. The lowest division on the 0/1000 ohms scale is a quarter of an ohm. Only one standard type torch cell is used, and sensitivity of the instrument is 1,000 ohms per volt.

TRADE PRICES:

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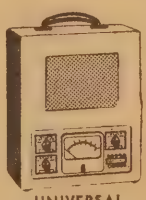

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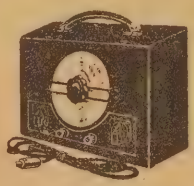

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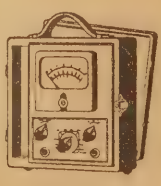

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body when we do not agree with its actions or lack of them, that does not imply censure of the body as a whole.

No one who has read our remarks concerning the WIA from time to time can fail to realise that we regard it as an essential focal point of all amateur activity, and worthy of universal support. We feel that the best possible criticism of any body is that which comes from within its ranks—from those in a position to know pretty well what goes on, and the implication of such things. It must not be left to outsiders, who as a rule are poorly informed, to point out things which should be altered.

In fact, we say advisedly that the Institute would benefit from more expressions of opinions by its members, and, morover, that it should welcome all such expressions. It aims to be a democratic body, and this implies the right and duty of free speech for everybody.

U.H.F. RESULTS

DESPITE the fact that the sensational conditions on 6 metres experienced during the summer months have subsided, reports are still being received of long-distance reception and transmission on this frequency, both in Australia and overseas.

In this issue we are detailing a simple converter which will cover the 6-metre band, and short-wave enthusiasts could do worse than to listen round in this region. Apart from a goodly number of local amateurs operating there, there is always the chance that some DX will "come good" at the most unexpected moment.

It is anticipated that next summer the results already achieved will be repeated, and a knowledge of conditions and simple equipment will be a great help in joining in the fun. One can only regret that the gear now being used was not in operation a few years ago. This gear has probably as much to do with better results as any other factor.

WORLD SPEED RECORD

AMONG the most interesting news of the month is the report that an American "Shooting Star" has broken the world's air speed record, and in trials flew at nearly 650 miles per hour.

This, of course, is a colossal speed, and getting nearer the speed of sound. It may be assumed that at least three of the major nations have aircraft capable of substantially equalling this performance. From now on they will approach the critical speed with great care. It may well be that before we see operational aircraft which will fly at greater than sound speed, revolutionary changes will be made in design, particularly of the wing. Our guess is that some kind of "flying wing" will replace all orthodox high speed planes of the day.

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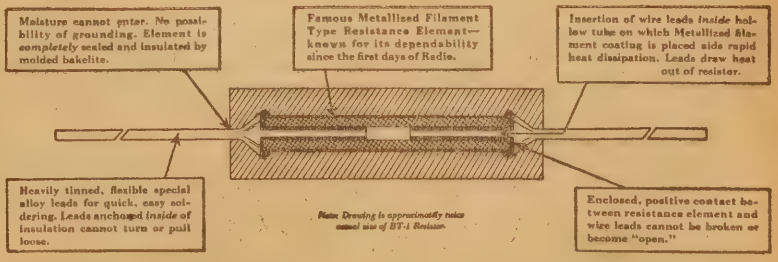
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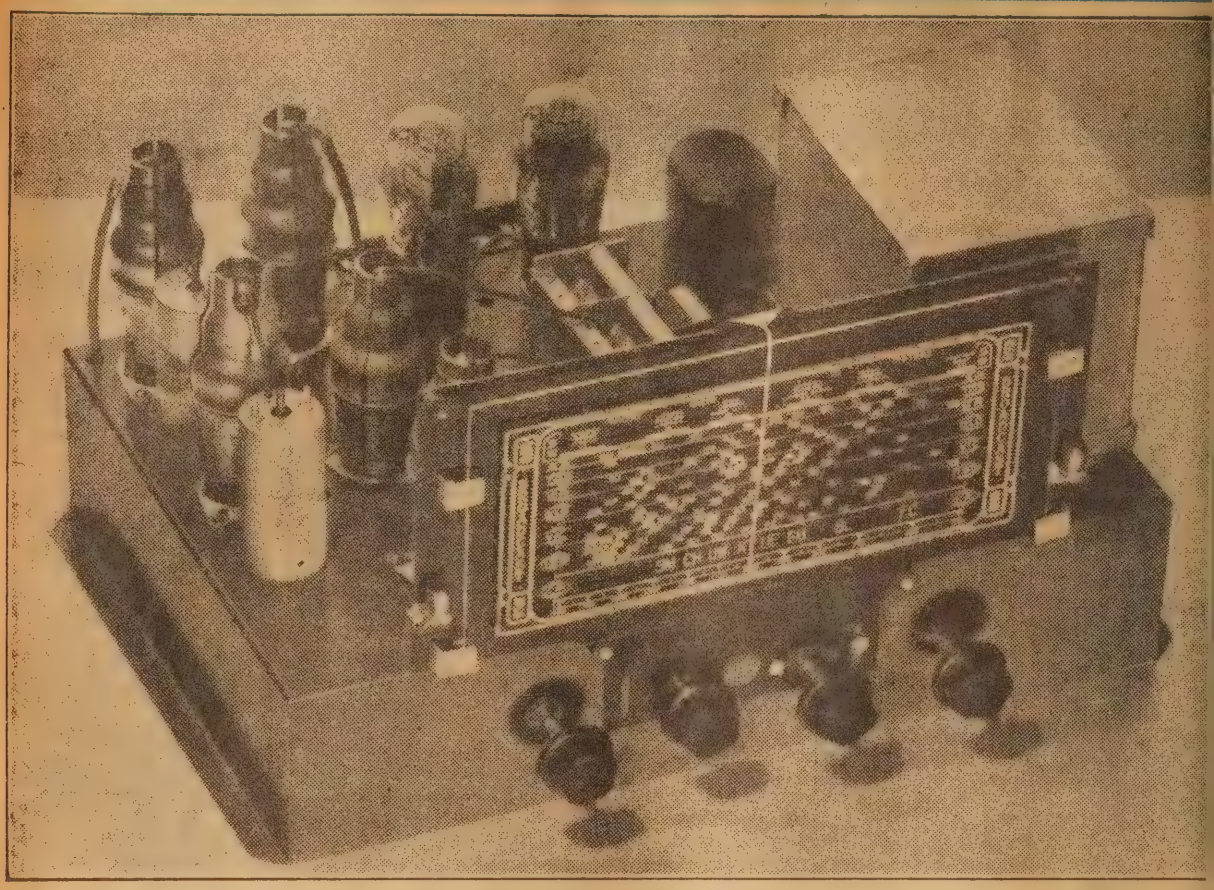


This picture gives a good general idea of the layout. It is very similar to that of an A.C. set except that the vibrator unit takes the place of the power transformer and rectifier. The speaker transformer can be seen at the rear of the chassis.

A BIG BATTERY RADIOGRAM

The Vibragram Seven is the finest receiver we have ever described for country listeners. Operating from a single six-volt accumulator, it provides two-band reception, with quality and power output not available from other battery sets. The push-pull output system with bass boost is ideal for gramo reproduction.

by W. N. Williams

EVERY time we describe a big set for power mains operation, we receive letters from country listeners requesting a similar design to meet their own requirements, for a receiver which is capable of higher power and better quality than the average run of commercial battery sets.

DESIGN PROBLEMS

The problem of designing a large battery set is, of course, complicated by considerations of current drain. The more amps and milliamps a set draws, the more frequent must be the owner's visits to the local garage or radio store—and every visit costs money.

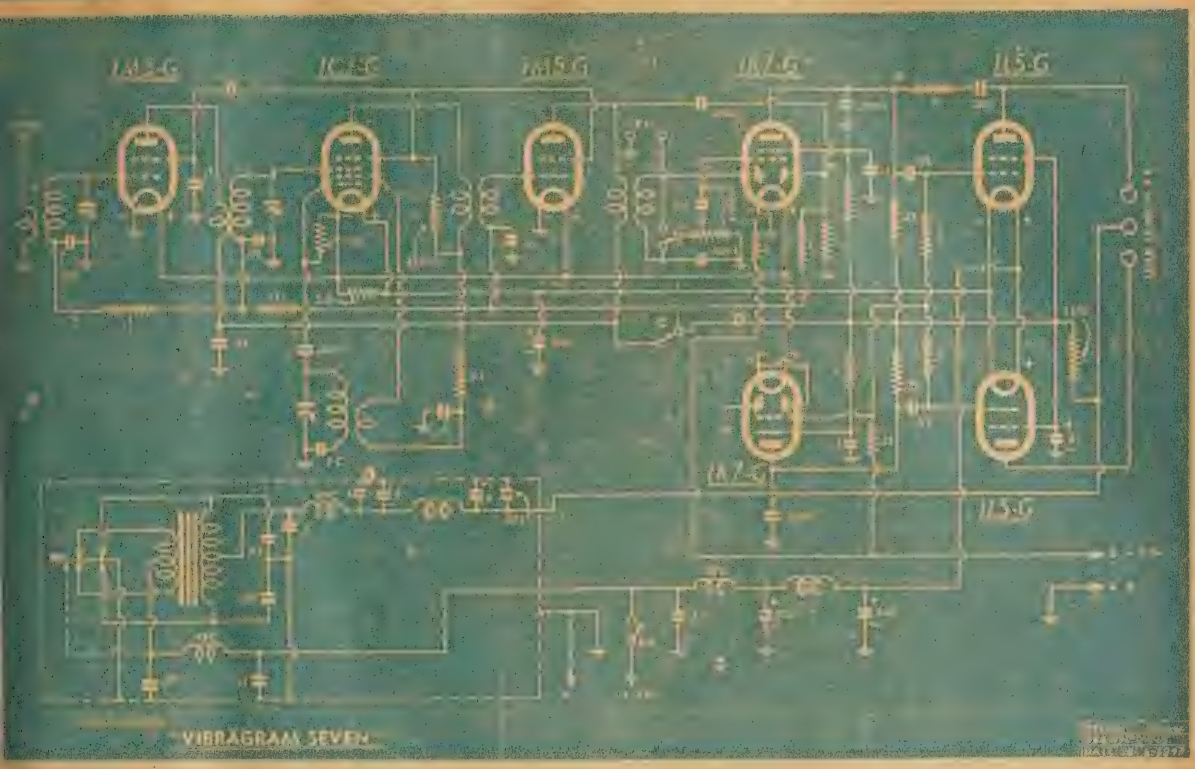
However, there are quite a few readers these days in the happy position of being able to charge their batteries from farm installations or vehicles, and, assuming a vibrator power supply, the upkeep of a set ceases to be a serious problem.

At least that is the line of argument adopted by readers in favor of better and bigger battery sets. Our new Vibragram is intended to meet this apparent demand and, in thi respect, breaks new ground in se design. If readers show their interes in the receiver, it may well be th forerunner of other big vibrator sets.

But we are not trying to sell reader on the idea of large sets or high cur rent drain. If you just want the new and markets, and a spot of entertain ment during the evening, there is n particular point in operating mor than a five-valve set. It is made fo just that purpose.

The new Vibragram is essentiall for the quality enthusiast who fee the urge to "turn up the wicks" little and let his orchestra really pla —drums and all! And, if the stati is too severe for good listening, he ca flick the switch around to the nex

CIRCUIT DIAGRAM OF THE VIBRAGRAM SEVEN



Here is the complete hook-up of the set including the power supply.

osition, get out the record album, nd provide his own music for the vening.

OR DANCING

And for dancing? Yes, the new ibragram has plenty of volume for a irge room.

In planning the Vibragram there ould be little doubt as to the general nes of the circuit design. Being an mbitious type of set, we felt it should rovide for dual-wave reception. This eature is likely to be important to ne country listener, who can thus me on frequencies not so badly ffected by static.

The set had to have an RF stage nd conventional converter valve. We esitated for some time about IF mplification, whether to provide one two stages. A two-stage IF chan-el is an excellent scheme, provided uitable low gain IF transformers are sed. While these are available, we ther feared that many constructors ould try and make do with conven-onal transformers, and thus lead emselves into difficulty with in-ability.

NE I.F. STAGE

Because of this and the extra cost volved, we ultimately chose to use single IF stage with conventional gh gain IF transformers. This is llowed by a diode detector and ntode amplifier in the one envelope. Coming to the audio end, there is again room for discussion. A push-pull audio system seemed an inevitable choice, but with what valves and what input system? One can obtain quite impressive figures of power output by using a-c type output valves, but only with a steep increase in operating current. And we felt that

PARTS LIST:

RECEIVER
- 1 Chassis 16 x 11 x 3½ inches.
- 1 3gang tuning condenser.
- 1 Tuning dial to suit (Efco USL-46).
- 1 Dual-wave coil kit.
- 2 455Kc. iron-cored I.F. transformers.
- 5 Valve shields.
- 1 3 x 3 Rotary switch.
- 1 Low tension iron-cored filter choke.
- 1 Low tension R.F. choke.

RESISTORS
- 2 2-meg., 4 1-meg., 2 .5-meg, 3 .25-meg., 2 .1-meg., 1 50,000 ohm, 1 35,000 ohm., 1 20,000 ohm, 1 1500 ohm, 3 Watt W.W., 1 5.5 ohm, 3 Watt W.W., 1 .5 meg. Volume control.

CONDENSERS
- 3 500 mfd., Electrolytics 12 P.P. 1 8mfd. Electrolytic 525 P.V. 1 .25 mfd. tubular, 4 .1 mfd. Tubular, 5 .05 mfd. Tubular, 1 .02 mfd. Tubular, 1 .001 mfd. Mica, 5 .0001 mfd. Mica.

SOCKETS
- 7 Octal, 1 5-pin.

VALVES
- 2 1M5-G, 1 1C7-G, 2 1K7-G, 2 1L5-G.

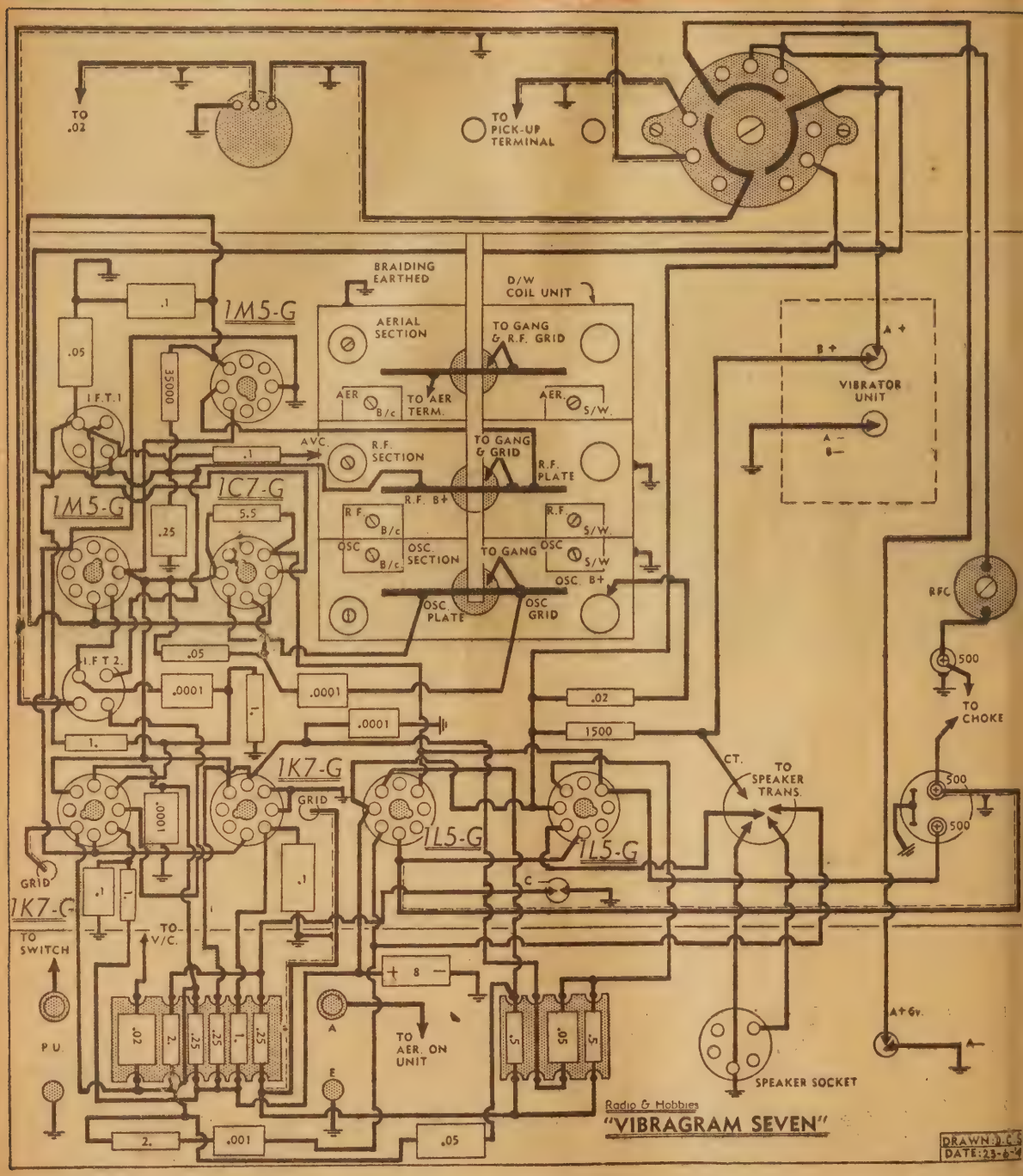
SPEAKER
- 12in. Permagnetic type, 25,000 ohm C.T. transformer.

SUNDRIES
- 4 knobs, 4 terminals, hook-up wire, shielded wire, nuts and bolts, solder lugs, 5 small grid clips, 1 extension shaft, resistor strips, spaghetti, 2 dial lamps.

VIBRATOR
- 1 Metal Box, 6 x 4½ x 4¾ inches (see text).
- 1 Base plate, 5½ x 3⅜ inches (see text).
- 1 Vibrator transformer, 6V input, 200V output at 30mA.
- 1 Synchronous Vibrator Cartridge Oak 35ZH or similar.
- 1 Valve socket to suit vibrator.
- 1 High tension iron-cored filter choke.
- 1 High tension R.F. choke.
- 1 Low tension R.F. choke.
- 2 8 mfd. Electrolytic condensers 525 P.V.
- 1 .25 mfd tubular condenser.
- 3 .1 mfd. tubular condensers.
- 2 .02 mfd. mica or tubular condensers (not less than 600 volt working).
- 1 .002 mfd. mica condenser.

Hook-up wire solder lugs, nuts and bolts, 4 long bolts for mounting Vibrator unit.

THE VIBRAGRAM SEVEN UNDER-CHASSIS WIRING



This is not a difficult set to build, but will need care and a complete understanding of the circuit. Study all diagrams carefully before making a start.

the whole purpose of the set would be defeated if the current drain became prohibitive.

So the choice fell on a pair of battery output pentodes which we planned to operate at the maximum voltage considered safe for the valves. Good power output could thus be expected with the natural economy of battery type valves.

Then there is the matter of signal input system. An audio transformer was one obvious answer, but not necessarily the best one for the purpose. A good transformer is likely to cost a couple of pounds and, because of this and their relative scarcity, constructors sometimes end up by pressing into service some transformer inherited from the last generation. And nothing could be more futile than wiring a bad transformer into a luxury receiver.

The phase-splitter idea is not very practical with directly heated valv so we turned to the so-called floati paraphase circuit, popular in USA. T was combined with a system of neg tive feedback and bass boost to pr vide what turned out to be a ve effective audio system.

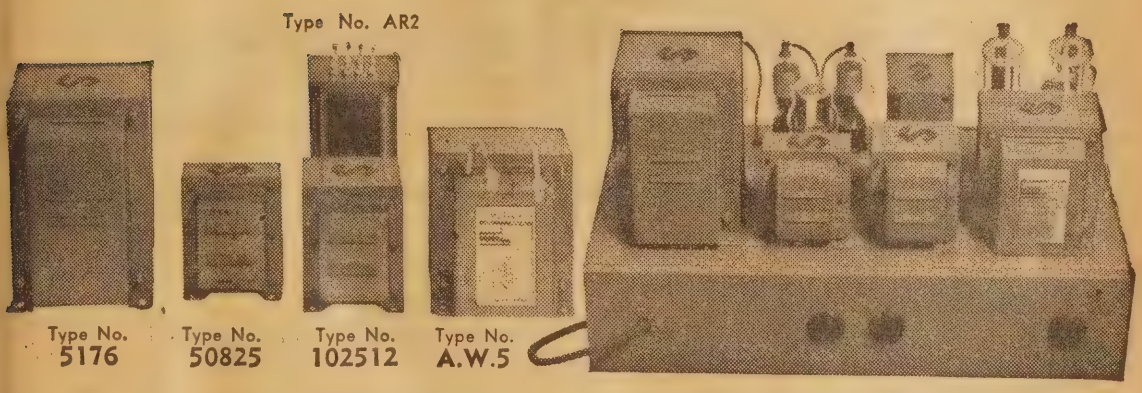
The choice of valves was never doubt, the 2.0 volt Australian ser being the only ones to merit consid ation. The alternative 1.4 volt val have economy of operation in th

RED LINE

EQUIPMENT

TRANSFORMERS and CHOKES

For the F.F.R. Amplifier



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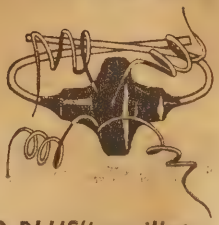
The **"Q PLUS"**  **1 R 5** OSCILLATOR COIL

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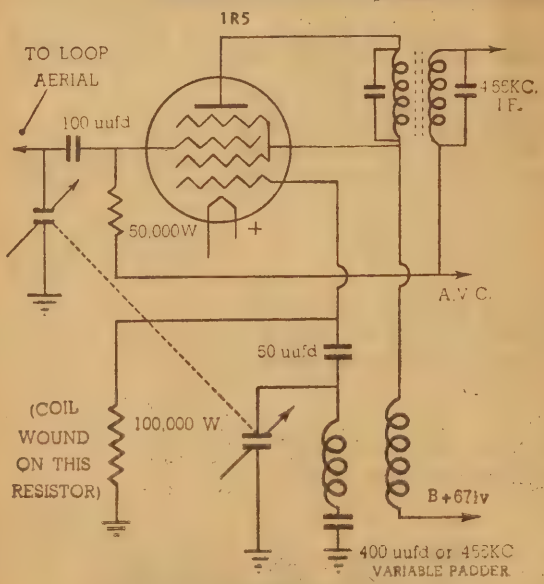

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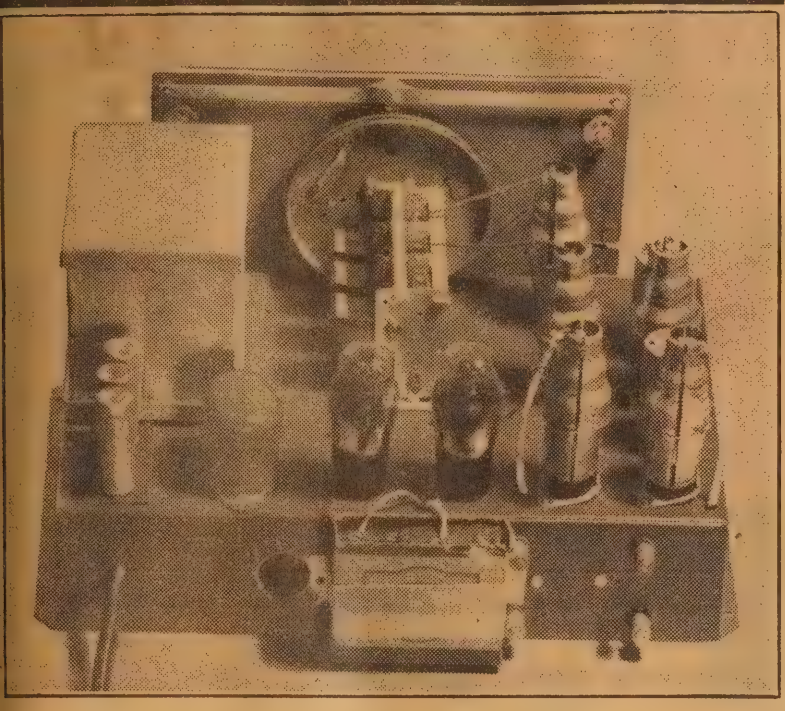
A REAR VIEW OF THE VIBRAGRAM



This photograph illustrates further details of the chassis layout.

avor, but that is about all. The relia-ility is well below the more rugged 2.0 volt valves, and they are in short upply as well. So the valve line-up esolves itself as follows: 1M5-G, C7-G, 1M5-G, 1K7-G, 1K7-G, 1L5-G, L5-G.

In building up the set, we followed he obvious course of using the new hassis designed for the 1947 Senior Radiogram. The sequence of stages s exactly the same, right round to the utput transformer. Three high capa-ity filament filter condensers mount ver the rectifier hole and the vibrator ower supply box occupies the space ntended originally for the a-c power ransformer.

The chassis has been made roomy nough to accommodate the largest of he coil units now available, so that he other two we know of can be made o fit in quite simply. You can use ither an AWA or Stromberg gang con-enser, with a dial of your choice cali-rated to suit the gang. A few addi-ional holes may be necessary to ac-ommodate different combinations of ang, coil unit and dial, but this can-ot be avoided. The problem of lay-ut was discussed at greater length in he article covering the Senior Radio-ram.

The RF amplifier and converter alves mount alongside the gang con-enser, with the IF channel along the ıter edge of the chassis. The audio ystem ranges in a straight line along ıe rear edge of the chassis—1K7-G oltage amplifier, 1K7-G phase inver-r, the two 1L5-G output valves, and ıe output transformer.

The series-parallel arrangement of the filaments, necessary to operate from the 6.0 volt supply, affects the circuit design because of its relationship to the biasing of individual stages. The seven filaments can actually be arranged to avoid shunt resistors and to allow the first three valves to be switched off while the set is operated as a gramo-amplifier.

While this appears at first glance a neat scheme, it necessitates operating the IF amplifier at a high negative grid bias and also imposes unequal bias conditions on the four valves in the audio system. The network necessary to correct this condition is cumbersome enough to offset any gain in the filament circuit.

FILAMENT NETWORK

The final arrangement puts the two output valves in parallel at the positive end of the network, with the 1C7-G suitably shunted in the centre of the string. The resultant 2.0 volts effective bias fits in very neatly with the requirements of this valve. The other four valves are at the earthed end of the network, having no initial bias with respect to chassis.

When wiring up the filament network, be very careful to follow the circuit exactly and never switch the set on unless all the valves are in place. Special efforts may be necessary to obtain the 5.5 ohm resistor shunting the 1C7-G filament, but the need for this cannot well be avoided.

The circuit around the first three valves is quite conventional and re-

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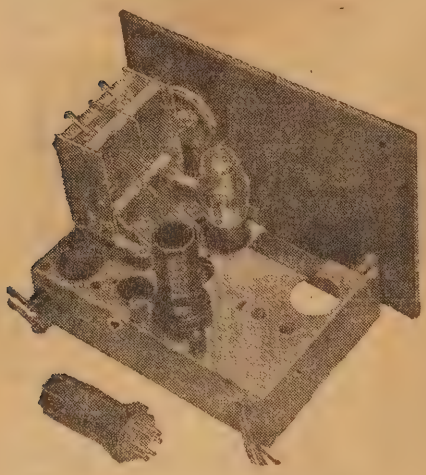
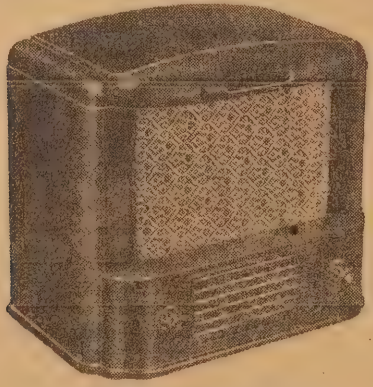
THREE FINE KIT-SETS



1-Valve Kit-Set

Build your very first set from the Electronic Parts 1-valve (broadcast and S.W.) kit-set, designed especially for those starting experimental work. Full details of coil winding, how to mount the parts, method of wiring, etc., are given with the kit. It comes to you complete with valves, all material necessary to build the set and wind the coils, and headphones and batteries. Note the low price—only £6/18/-. (Freight approx. 6/- extra).



4-Valve Kit-Set

If you would like to build a really professional receiver this 4-valve broadcast operated mantel set for 240 volt A.C. operation is ideal. With black or walnut plastic cabinet, this set comes complete with all necessary parts, including valves and Rola 5in. permag speaker. Circuit diagram and building instructions are included. Send for descriptive leaflet.

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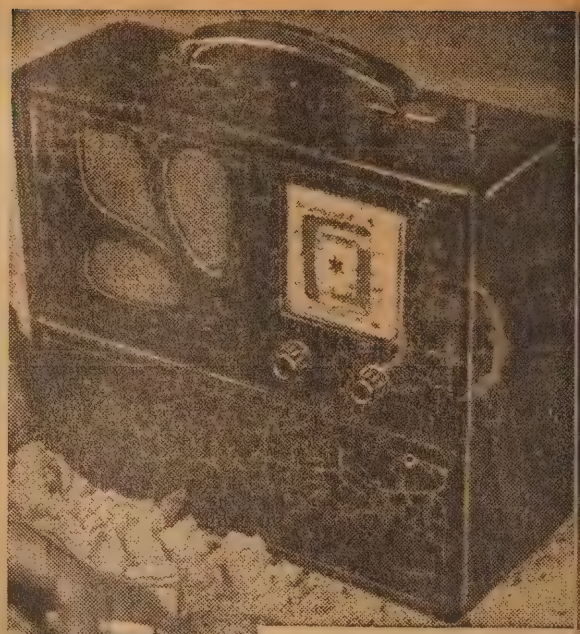
Are you interested in Test equipment of any description, kits of parts for multimeters, oscillators, etc? If so, write to us for full details. We stock all radio replacement parts. Our Trade repair department will give you prompt service on repairs to speakers, test equipment, meters, radio receivers, pick-ups, amplifiers, etc.



This latest Electronic Parts 1.4 V portable has remarkable sensitiv The kit is complete with R speaker, valves, Minimax Batter etc., for the bedrock price of £15/12/0 (freight approx, extra). Technical leaflet availa upon request.

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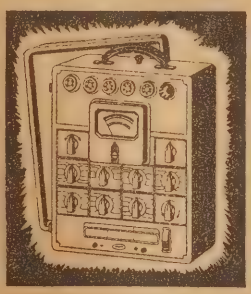
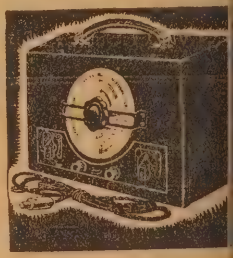


THE "UNIVERSITY" SUP TESTER (left). This is a m versatile Valve and Circuit Tes featuring the extraordinary ro test chart—entirely new to A tralia. £28/10/0, plus tax. S for free descriptive brochure this and other "University" struments.



THE "UNIVERSITY" OSCILLATOR (right). An extremely efficient instrument providing R.F. and A.F. signal frequency range from 160 K.C. to 32 m'cycles. Battery operated. £12/15/0 plus tax. Send for free illustrated brochure.

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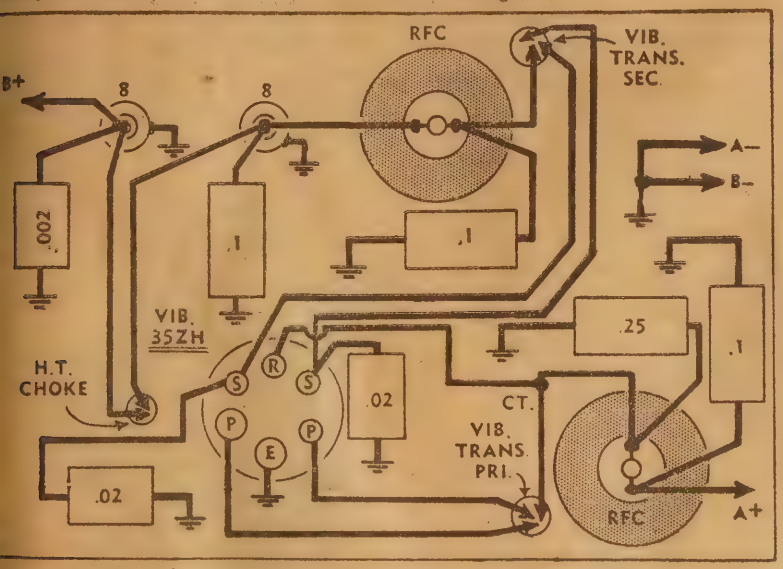
uires no particular comment. Arnge the wiring to keep the leads ort and the components as near as ossible to the circuit points they are tended to serve. A couple of the VC filter components may already be uilt into the coil unit box, and this oint should be checked to see that ey are not unnecessarily duplicated.

IODE CONNECTIONS

Be careful not to confuse the two odes in the 1K7-G valve. The diode pin 5 must be used for detection and n 4 for the AVC circuit. Confusion the two diodes will cause loss of sentivity and severe distortion at low face to be nicely balanced. In actual fact, just the reverse is true, and application of feedback across the lower valves completely unbalances the operation of the amplifier.

Feedback in the position shown is effective for both output valves and, in operation, corresponds closely with the single-sided screen feedback in the phase-splitter type amplifier we have used so frequently. A small condenser in series with the feedback path reduces the feedback at the very low frequencies and gives a degree of bass-boost. We liked the idea so well in the Senior Radiogram that it was natural to make a similar provision in the Vibragram.



The wiring of the vibrator unit is very similar to that used for previous "Vibra" receivers. A larger power transformer is employed.

odulation levels.

The first 1K7-G is wired as a conentional pentode audio voltage amplier giving a gain of about 70 times. his feeds into the upper output pende.

The grid resistor for this valve joins he grid resistor for the lower valve, assing through a third resistor to the ias source. Thus portion of the grid eturn circuit is common to both alves. The lower 1K7-G receives its ignal from the junction and is reistance-coupled to the grid of the ower output valve. This valve thus perates purely to reverse the phase of he signal for the lower output valve.

If one assumes equal and opposite ignal voltages on the two output rids, there can obviously be no sigal for the grid of the 1K7-G phase nverter. Hence the circuit does not nd cannot provide exact balance. lowever, the very high gain of the K7-G phase inverter ensures that the ut-of-balance factor is no more than or 2 per cent., and, in actual fact, e could not notice the mismatch by nspecting the signal grid voltages on n oscillograph.

Feedback is applied between the late of the upper output valve and s associated voltage amplifier. A milar circuit published elsewhere me years ago showed feedback reistors between each output valve and s voltage amplifier—a circuit arngement which appears on the sur-

SCREEN FEED

Another point of note is that separate screen feed resistors are used for the two 1K7-G valves. We had originally provided for a common feed resistor and bypass, but found that it produced a tendency to motorboat at a very low frequency—something down around one cycle per second. The valves operate quite happily with the three volts bias, which is also common to the grid circuit of the 1L5-G output valves. It is obviously desirable to have some common bias value for all valves in this audio circuit if the necessity for too many coupling circuits is to be avoided.

If you feel that the bass response is too high, simply connect the feedback resistor between the two plates without the series condenser. Omitting the condenser and resistor altogether removes the feedback. The gain increases, but the reproduction becomes thinner in quality.

So far as the 1L5-G valves are concerned, their actual operating bias is -7.0 volts, 3.0 volts applied directly to the grids and 4.0 volts by virtue of the filament connection. This higher bias was desirable because it was intended to operate the valves with 180 volts on the screens and up to 200 volts on the plate. A high plate and screen voltage is essential in the interests of good power output. Thus,

ACCURATE ALIGNMENT

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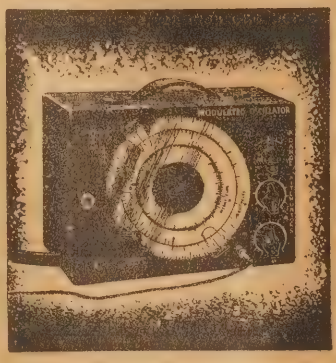

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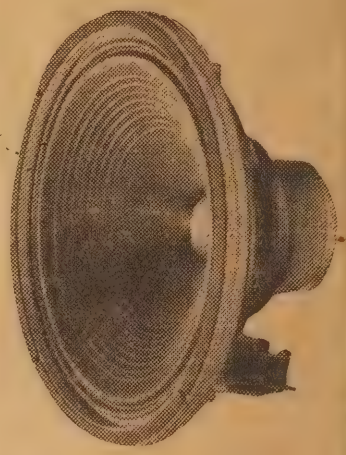
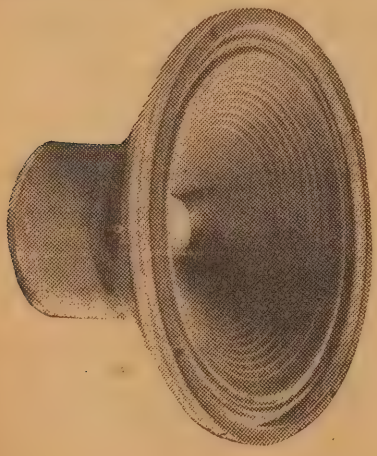
The first shipment of really high quality imported speakers since the war has arrived. For use with auditorium and public address equipment, these speakers, manufactured by Philips, England, will be eagerly sought by all sound enthusiasts. Quantities are limited but more are expected to follow.

TYPE 9806T (10 watts)



A high quality permagnetic cone speaker capable of handling 10 Watts undistorted output. This has been achieved by the use of the "ticonal" steel magnet and the careful design of speech coil and magnet gap.

SPECIFICATION: Maximum wattage . . . 10. Impedance at 1000 cycles . . . 15 ohms. Speech Coil . . . 12.5 volts. Field Strength . . . 14,500 gauss. Resonant frequency . . . 75 c/s. Depth of speaker . . . 6½ins. Outside diameter . . . 12⅛ins. Depth of magnet . . . 2ins. Width of magnet . . . 3 13/16ins. Weight of Speaker less Transformer . . . 12¼lbs.



TYPE 9809T (20-25 watts)

A 12in. permagnetic loudspeaker giving excelle reproduction under very great loads. It affor smooth bass response with a simultaneous cle crisp transient response.

SPECIFICATION: Maximum wattage . . . 25. Impe ance at 1000 c/s . . . 15 ohms. Speech coil . . . volts. Field Strength . . . 17,000 gauss. Resonc frequency . . . 75 c/s. Depth of Speaker . . . 7¼i Outside diameter . . . 12⅛ins. Depth of Magi . . . 2½ins. Width of Magnet . . . 5½ins. Weight Speaker less Transformer . . . 17lbs.

Also available is Type 9802T—a 10-watt small diaphra speaker for use with multi-cellular or exponential ho

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increasing the voltage from 135 to 180 volts, more than doubles the power output.

The output transformer should reflect a load of 25,000 ohms plate-to-plate. It can be of the type normally fitted to permagnetic loudspeakers, but we suggest that it be mounted on the chassis to avoid long plate leads.

One point we missed. The audio end of this set is intended for alternative use as a gramophone amplifier. The radio-to-pickup switching is controlled by the off-on switch, which can be of the 3x3 single-bank variety.

SWITCH CONNECTIONS

In the first position, one section breaks the low tension circuit, so that the set is inoperative. The centre position closes the low tension circuit, connects the volume control to the diode detector circuit, and applies high tension to the valves in the tuner portion of the set. The final position leaves the low tension supply on, transfers the volume control to the "hot" pickup input terminal, and lastly breaks the high tension supply to the valves in the tuner. All leads to the volume control, pickup switch and pickup terminal need to be shielded.

POWER SUPPLY

The receiver requires a high tension supply of between 180 and 200 volts at about 30 milliamps, and this can be provided economically only by a vibrator type supply. To meet the requirements of this set, we therefore arranged with a manufacturer to turn out a vibrator transformer giving approximately 200 volts filtered d-c at a nominal current drain of 30 milliamps. These transformers should be available on the market as a standard line, and it is possible that other manufacturers, too, may produce vibrator transformers to the same specifications.

Every effort should be made to obtain something like 200 volts on the output plates and about 180 volts on the screens. A higher voltage would be hard on the valves, while a lower voltage will reduce seriously the undistorted power output.

THE VIBRATOR

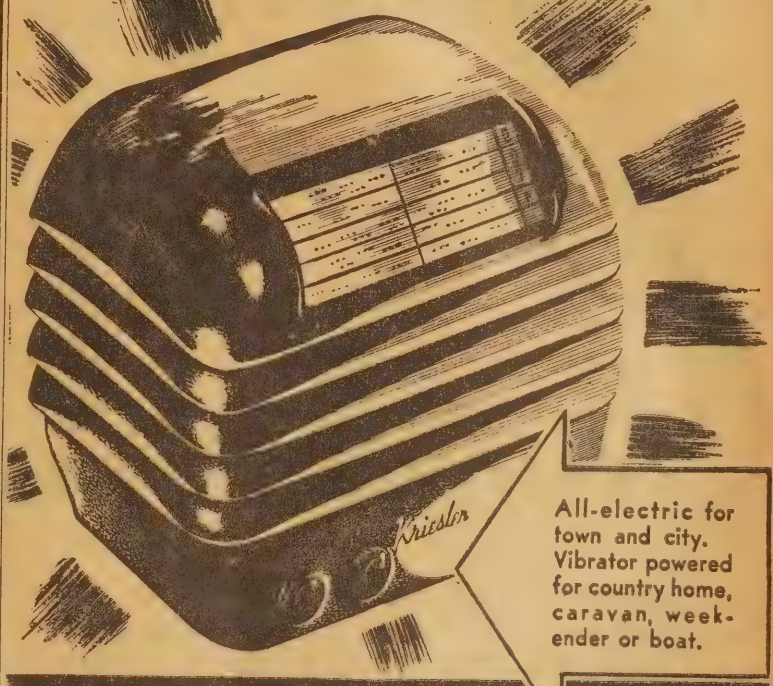
In electrical design, the vibrator unit for this set is somewhat simpler than the unit specified for the Vibra Four and Vibra Five receivers. Split reed type vibrators are not in good supply just now, so that the ordinary synchronous type cartridge was selected. The elimination of the back bias circuit with its additional filtering makes a noticeable difference to the number of parts required.

Instead, a 4.5 volt C-battery was attached to the rear of the chassis to provide the three volts bias for the four audio grid circuits. It is no great trouble to replace the battery every 12 months or so.

For the vibrator power supply, we followed the same unit construction plan that proved so successful with the smaller Vibra sets. The vibrator transformer, cartridge, filter choke and filter components are all mounted

(Continued on Page 69)

You've *heard* about it!
read about it!
here it is!



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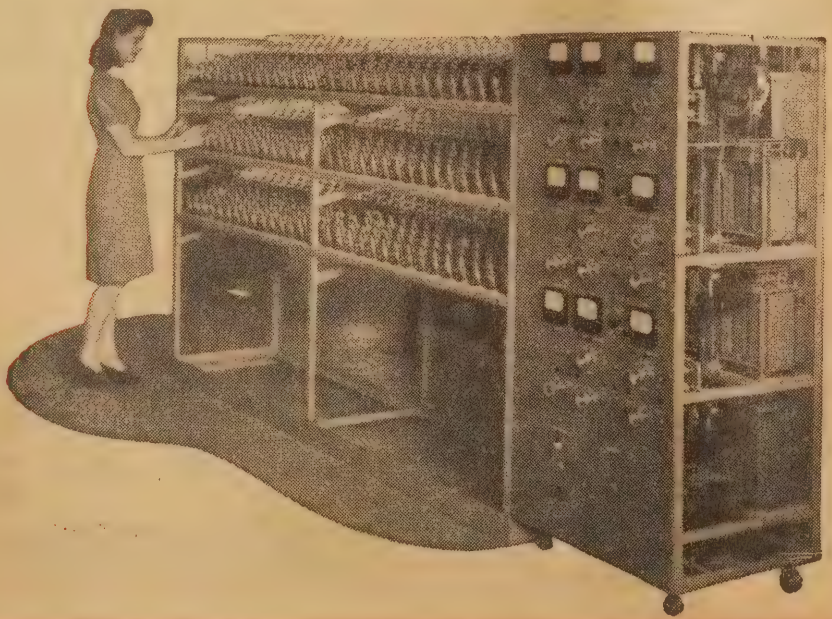

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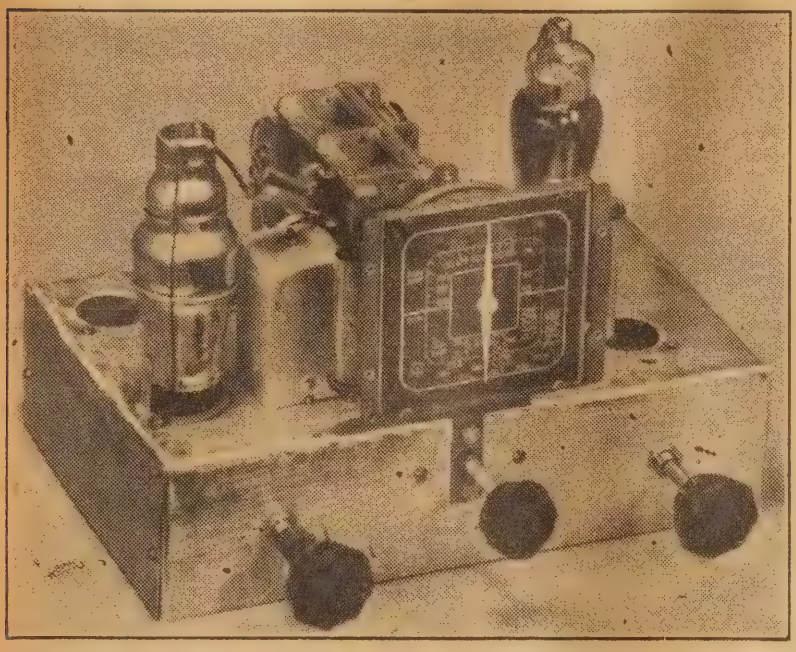
THE 1K5-G TWO VALVE BATTERY SET



The set is now beginning to take shape in its progress from a one valver to a four valver.

Let's assume that you followed out last month's article and successfully completed the "1K5-ONE" receiver. This month's project is to add an audio stage to the set, which will considerably increase the gain. Your "1K5-TWO" will have plenty of power for earphones on all stations and may even operate a loudspeaker successfully on the strongest of them.

FIRST of all, a few words about the function of an audio stage. Although a regenerative detector provides considerable amplification, the signal impulses in the plate circuit are relatively weak. Signals from the stronger stations may be heard at good strength in the earphones, but others are just too weak to follow clearly. An audio stage amplifies all signals, bringing the weaker ones up to comfortable listening level.

RESISTANCE COUPLING

Referring to the circuit diagram, the plate of the detector is now fed through a 0.1 meg. resistor, which, therefore, takes the place of the earphones in the one valve version. Variations of detector plate current at signal frequency produce voltage variations across the 0.1 meg. plate load resistor.

These voltage variations are impressed on the grid of the following amplifier valve through the .02 mfd. coupling condenser. This condenser passes on the signal voltage variations, but prevents the positive d-c plate voltage from affecting the grid of the following valve. A negative bias is applied to the grid through the 1.0 megohm resistor.

The majority of valves require some negative grid bias when used as audio amplifiers. The bias limits the plate current to a reasonable figure and also ensures better fidelity in amplification. The bias voltage necessary varies according to the type of valve in question and the operating potentials on plate and screen. More of this later.

The signal voltages applied to the grid are amplified by the valve and appear as variations in the plate current of the amplifier valve. These variations, which are greater in magnitude than in the previous stage, are translated into sound by the earphones or loudspeaker.

When adding to your "1K5-One" receiver, it is assumed that the set will ultimately become the "1K5 Four." The extra valve, therefore, is installed in the position of the output stage, leaving room for the addition of still another audio voltage amplifier stage at a later date. The extra parts you will need to make the addition are shown in the accompanying list.

Let's assume, then, that you are ready to get on with the job. Begin by removing the lead which joins the RF choke to the loudspeaker or phone socket. This clears the way for the addition of the new components.

Mount the new valve socket in the hole adjacent to the speaker or phone plug. Connect the negative filament pin to an earth point and run a lead from the positive filament pin to the "off-on" switch, as shown in the diagram. Next job is to wire up the plate and grid circuits.

Instal a 0.1 meg. resistor on the resistor panel, one end connecting to the RF choke and the other to the free lug immediately opposite. This free lug is then bridged across to the lug "next door" but one, which is already connected through the B-plus

SHIELDED LEAD

Before proceeding further, obtain a short length of shielded wire for the grid lead of the 1K5-G output valve. Snip off a length sufficient to reach, with a little slack from the appropriate lug on the resistor panel, up through the chassis to the grid cap of the 1K5-G. Work the braiding along so that a little over an inch of the braid can be snipped off without cutting the inside conductor. Then work the braid back along the wire until

PARTS LIST

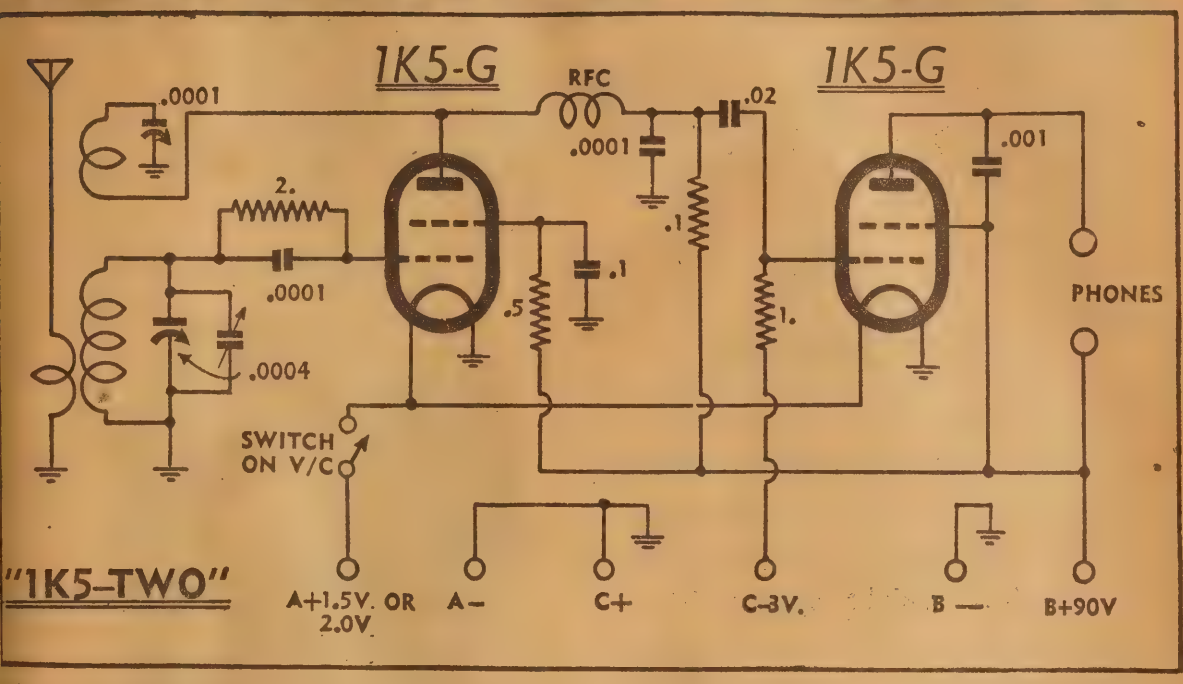
Here are the parts you have already in your one-valve set.

- 1 Chassis, 10" x 6½" x 2½".
- 1 "H" type two-gang condenser.
- 1 Tuning dial (Efco type CD/17 or similar).
- 1 RF coil with reaction.
- 1 .0001 mfd. midget reaction condenser.
- 1 0.5 meg. potentiometer with "off-on" switch.
- 1 Octal socket, 1 6-pin, 1 4-pin.
- 1 RF choke.
- 1 0.1 mfd. tubular condenser.
- 2 .0001 mfd. mica condensers.
- 1 Trimmer condenser (if not fitted to gang).
- 1 2.0 meg. resistor.
- 1 .05 meg. resistor.
- 1 Type 1K5-G valve.
- 1 45-volt B-battery.
- 1 1.5 volt cell or 2.0 volt accumulator.
- Earphones, 2 terminals, 1 grid clip, 6-pin battery plug, 4-pin speaker plug, 7-position resistor panel.

And here are the extra parts you will need:

- 1 1K5-G valve.
- 1 Octal valve socket.
- 1 0.1 meg. resistor.
- 1 1.0 meg. resistor.
- 1 .02 mfd. tubular condenser.
- 1 .001mfd. mica condenser.
- Short length of shielded wire.
- 1 45-volt B battery.
- 2 1.5 volt torch cells.

CIRCUIT OF THE IK5-G TWO VALVE RECEIVER



As will be seen from this circuit, the extra valve is an audio amplifier resistance, coupled to the detector.

ou have just over a half inch of the nsulated wire protruding from each nd.

Rub the edges of the braid flat, near very lightly with flux and tin ound the edge of the braid to pre- ent fraying. Now, with a razor blade sharp knife, cut through the in- ilation to leave about a quarter inch the inner conductor bare. This an be tinned for connection into ne circuit.

One end of your shielded lead can be oldered to the appropriate lug on the esistor panel and the outer braiding oldered to the earthed lug under the ounting bolt. A small grid clip can e attached to the other end of the ad for connection to the 1K5-G grid ap.

On this same end of the resistor anel instal a .02 mfd. coupling con- enser and a 1.0 meg. resistor, linking em together at one end where they oin the 1K5-G grid lead. The free nd of the condenser links across to ne RF choke while the 1.0 meg. grid esistor connects to the bias batteries.

These bias batteries are mounted by clip behind the gang condenser. The lip can be fashioned from a scrap f aluminium and it should be bent nd drilled to hold the cells snugly in lace.

ERIES CONNECTION

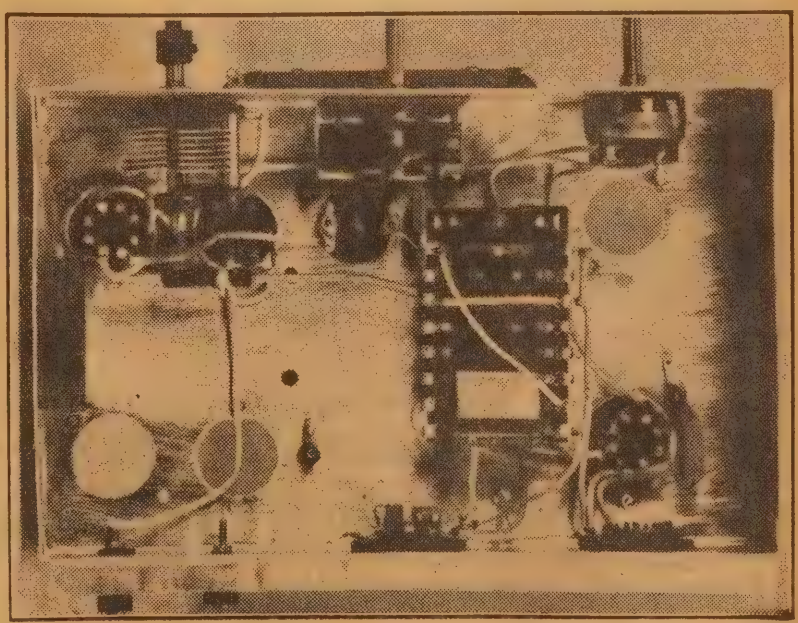
Connect the cells in series by solder- ng a lead from the centre cap of one the bottom of the other cell. Take wire from the remaining centre posi- ve terminal, which is C-plus, down rough the chassis to an earth lug. second wire goes from the base of the other cell, which is C-minus, down through the chassis to the end of the 1 megohm grid resistor.

Connect the plate pin of the 1K5-G output valve to the phone or speaker socket, connect the screen to the B-plus wiring and finally instal a .001 mfd. condenser between the plate and screen pins at the socket. This completes the job of wiring.

Check over your work and before plugging the valves in, connect up to the batteries and to the aerial and earth. Plug in the earphones and test the voltage across the filament pins with a torch lamp. If all is in order, plug in the valves and the set should operate without further ado.

The one valve set operates quite well from a 1.5 volt A-battery and a 45 volt B-battery. This set, too, will operate satisfactorily from a 1.5 volt

(Continued on Page 37)



This picture shows the placement of parts beneath the base.

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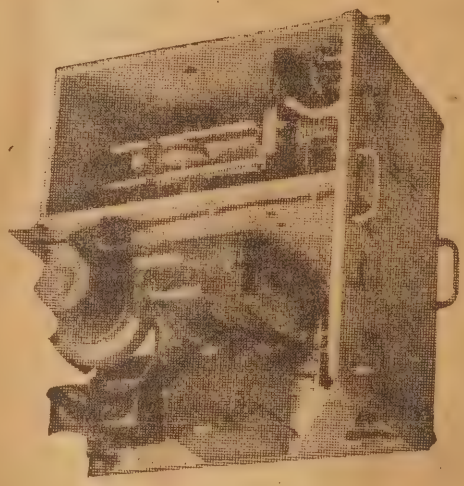

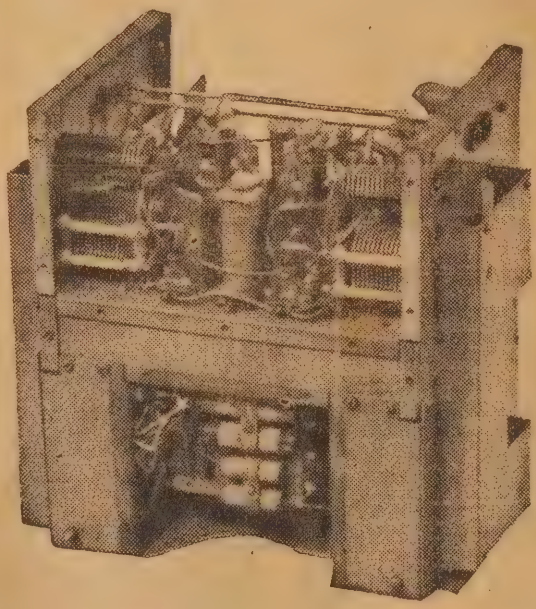

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1 "	1,000V	"	.. ..	3/-
.5 "	4,000V	"	.. ..	10/-
.25 "	2,000V	"	.. ..	3/-
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.005 "	2,500V	"	.. ..	1/-

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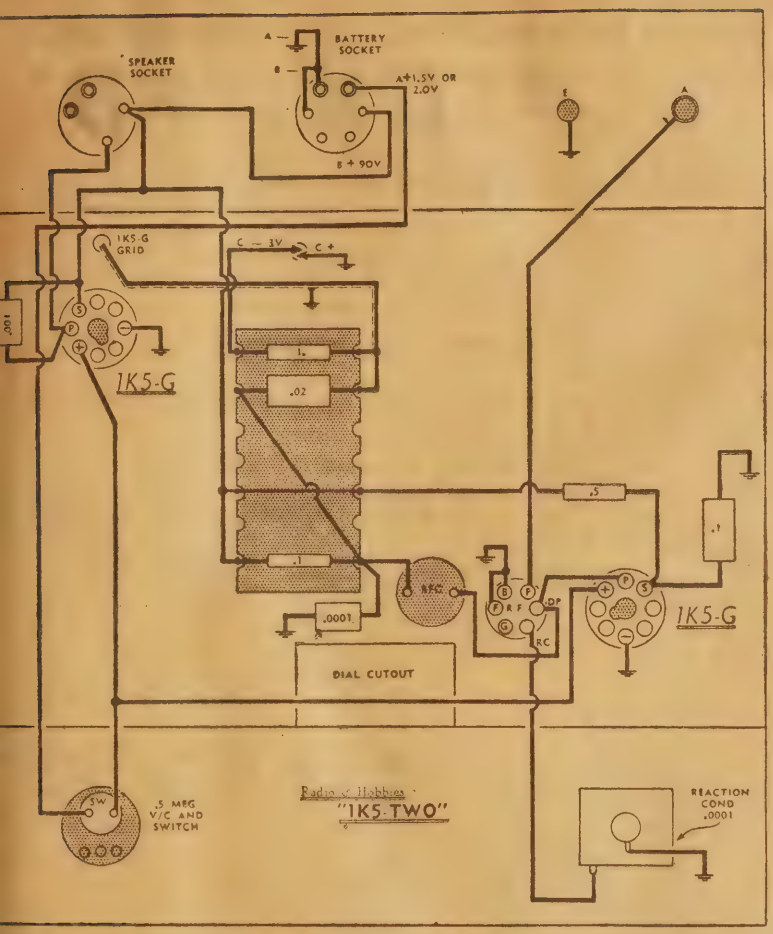
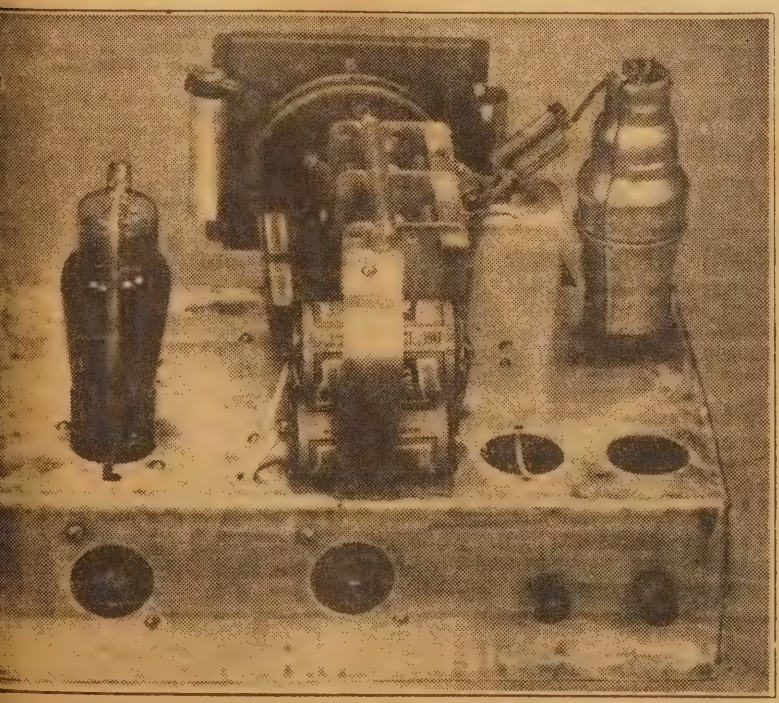


The underchassis wiring of the 1K5-TWO two-valver.

(Continued from Page 33)

-battery, provided the cell is large ıough to handle economically the ain of the two valves at 1.5 volts, namely about 0.18 amp. However, it is better to use a 2.0 volt accumulator for the set if you can manage it.

It is assumed that the ultimate four



View from the rear. Note the bias batteries held in place by a clip.

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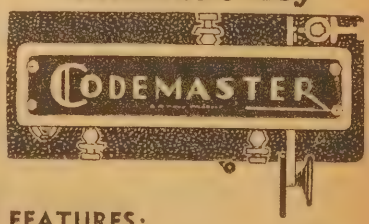

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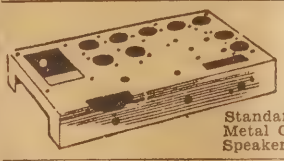

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valve set will operate from a 135 volt high tension supply, so that you may as well buy another 45 volt battery at this stage, bringing the high tension voltage up to 90. The suggested -3.0 volts bias on the 1K5-G grid is in order for this voltage. Alternatively you can use the set with the full 135 volt supply or from a single 67½ volt Minimax battery. The bias voltage will not need to be changed.

If, however, you plan to operate the set purely with earphones and from a single 45 volt battery, the grid bias voltage is better kept down to -1.5 volts. In other words, you will use just a single torch cell for the bias battery.

Such a wide variation in supply voltage will naturally have some bearing on the operation of the detector. In some cases the detector may now fail to oscillate over the whole band with a supply voltage of only 45. In this case, try reducing the value of the screen dropping resistor from its present value of 0.5 megohm. In an extreme case, the plate load resistor may also be reduced in value, but this will adversely affect the gain. Increasing the value of the screen resistor will restrict the oscillation on higher operating voltages.

EARPHONES

There is really little else to be said in the matter. Used with 2000 ohm earphones, the set should give really fine performance. With a high tension supply of 67 volts or more, it may operate a loudspeaker on the stronger stations. A sensitive 5-inch to 8-inch permagnetic unit is probably the best choice, but please yourself whether you buy the speaker now or next month when the third valve is added.

Much depends on the location and the aerial arrangement in a set of this type. You can expect some bother if you happen to be in the immediate vicinity of a powerful transmitter, but that is true of all small regenerative receivers.

Increasing the length of aerial will give you louder signals, but at the cost of selectivity, so you must experiment to obtain the best overall results.

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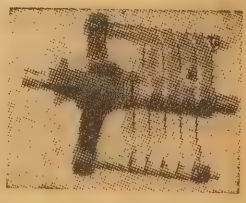

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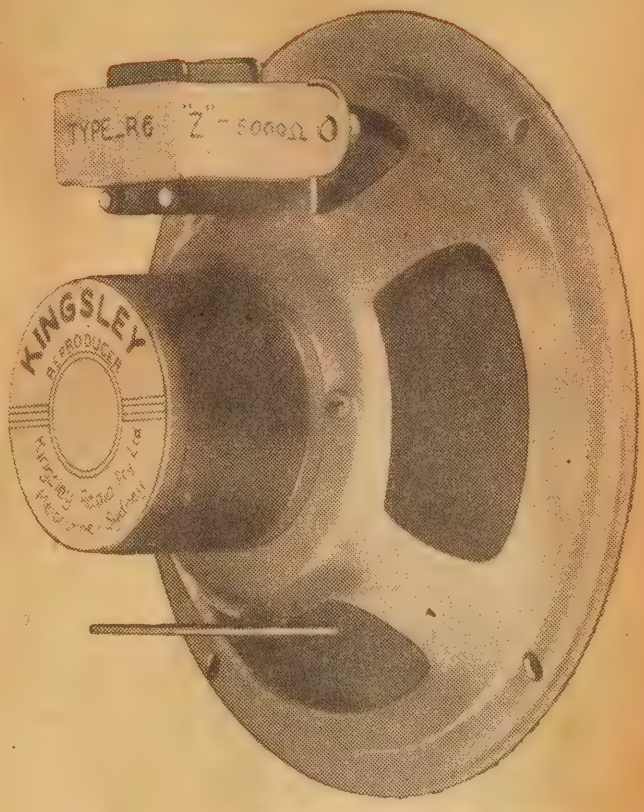

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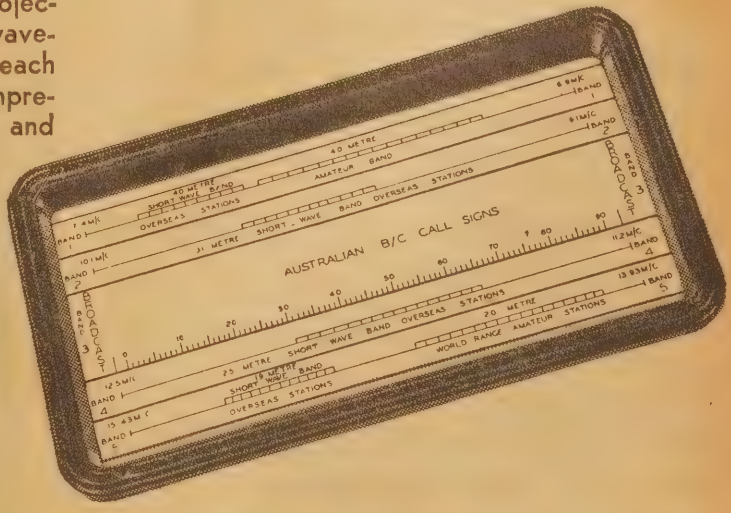

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FROM THE SERVICEMAN WHO TELLS

Only last month I had something to say about new tricks—on that occasion it was one for repairing wedge-type dial drives. Another new one intrigued me last week. It is not strictly radio servicing, but I found it interesting, nevertheless.

A FRIEND of mine has a car of popular American make, which quite suddenly began to give trouble. The motor ran smoothly under most circumstances, but faltered badly at certain critical speeds and would not accelerate evenly. The plugs and distributor points were checked and found OK and it seemed that the trouble had something to do with the fuel supply.

Because the job was due, anyway, my friend dismantled the carburettor, cleaned the jets, checked the petrol pump and cleared out the fuel lines. But the engine still faltered on occasions, and a more thorough check of the ignition system failed again to reveal trouble there.

My friend has a rudimentary knowledge of radio and thought that it might help solve his problem. So he borrowed a vibrator powered receiver, perched it on the back seat and connected it up to a separate accumulator. The aerial wire was led through and draped above the engine.

TERRIFIC RACKET

When the engine was started up, there was naturally a terrific racket from the ignition system, but that was part of the scheme. The car was driven out on to the road and put through its paces. You've guessed it! Each time the motor faltered, there was a break in the continuity of noise from the receiver. The trouble was clearly in the ignition system.

Ultimately he traced it through to a wire in the distributor which was broken inside the insulation. The wire was flexed by each movement of the automatic spark advance mechanism, and it opened up completely at certain critical positions. It was a simple matter to replace the lead.

A rather cunning stunt by a non-radio man, and one of those things which can be tucked away in the mental files for future reference.

CONDENSER BREAKDOWN

There are two causes for receiver breakdown which servicemen meet with the regularity of the sunrise. The ease with which the troubles are recognised and corrected contrast with another one I came across—one that had me puzzled for quite a while.

A breakdown in the first filter condenser is such a common fault that I can afford to generalise. Mrs. So-and-So rings to say that the receiver failed to come on in the morning and that working all the knobs produced no result. She tried it again a half hour later but the set was still dead.

Readers of these columns will be doing a public service if you acquaint your friends with the futility of leaving an inoperative receiver switched on for any length of time, or of expecting a breakdown to correct itself mysteriously during a half hour of idleness.

In one case out of a hundred that may happen. In the other ninety-nine cases damage to the receiver may be multiplied. A serviceman will almost certainly switch on a dead receiver as his first operation, but he knows the danger signs and always has his hand ready on the switch while he watches the valves warm up.

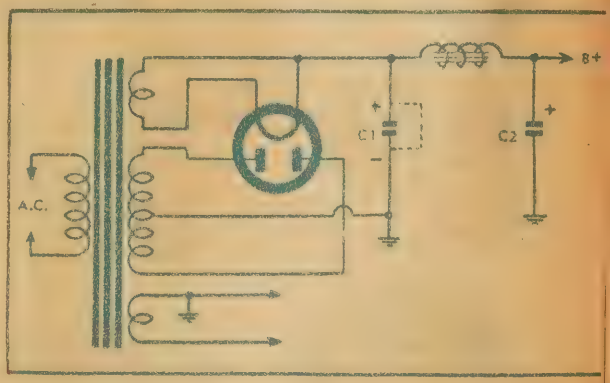
If the first filter condenser is at all weak, it will generally break down when the receiver is first switched on. One can hardly blame it for doing so in many cases. If the receiver has no initial bleed across the high tension supply, the condenser receives practically the full peak voltage of the power transformer secondary. You can work it out for yourself at 545 volts for a 385 volt power transformer. Let the mains voltage be a little high and the figure looks alarming against the 525 volt peak voltage rating of the usual electrolytic condenser.

DIRECT SHORT

So the condenser proceeds to break down and becomes a direct short across the ouput of the rectifier valve. Mrs. So-and-So has walked across the room to attend to the porridge, expecting presently to be greeted by the voice of her favorite early morning announcer. Or may be Mr. So-and-so may have switched the set on and forthwith busied himself with the utensils for his morning shave.

Presently the silence becomes apparent and one or other of the marital partners strolls over to the radio, twiddles the knobs and realises that something is amiss. According to the amount of genius or inspiration the receiver is bumped, the aerial wire pulled about, the power switch flicked on and off a couple of times. Finally the set is switched off to the accompaniment of suitable comments.

But during all that time a royal battle has been going on in the set between the power transformer and rectifier valve. With its output circuit shorted, the rectifier passes very high current which heats the plates to red heat. That is one of the danger signals a serviceman looks for when he peers behind the receiver after switching it on. Never let a set run if there is the slightest suggestion of flashing or overheating in the rectifier valve. Find the trouble and save your valve.



Overheating in the plates of the rectifier, or flashing over, almost certainly denote a breakdown in the first filter condenser. Switch the set off immediately to save both rectifier and power transformer

But back to the battlefield. The rectifier plates glow red, the filament becomes hotter than ever and the emitting surface of the cathode begins to disintegrate. A few moments of this treatment and the rectifier will forever after show "Low emission" on the valve tester.

STERNER STUFF!

In the normal way the filament gets so hot that it open-circuits and the battle is over. The serviceman finds a dead rectifier valve and a shorted filter condenser and, being in business for that very purpose, he is happy to replace both and charge accordingly. The delay in switching off the set costs the owner a rectifier valve and boosts the service charge by a corresponding amount.

But occasionally one strikes a rectifier made of sterner stuff. Though the plates are glowing red and the emission is steadily failing, it hangs on and continues to pass a few hundred extra milliamps. The power transformer begins to get hot about it, the paper insulation and the varnish smoulders and exudes the incomparable and characteristic odor which excites an electrician.

Turns begin to short across in the transformer and within a few moments it is belching smoke like a chimney and the acrid fumes of burning varnish condense all over the chassis in a brown gluey mess. By the time Mr.

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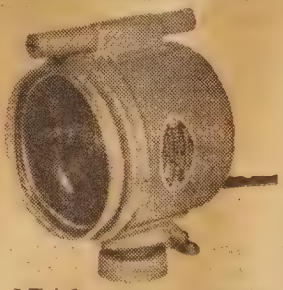
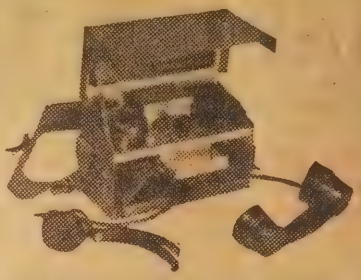
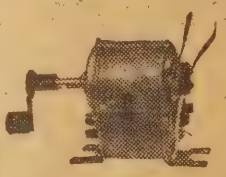


17/6 each 17/6



ARMY TELEPHONES



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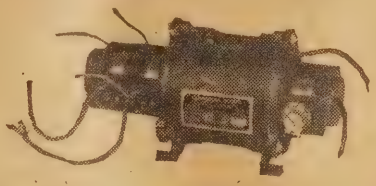

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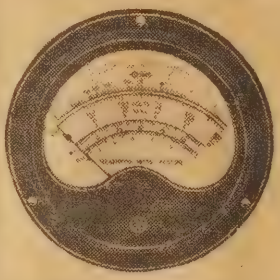

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20.0.20 Amps. **15/-**
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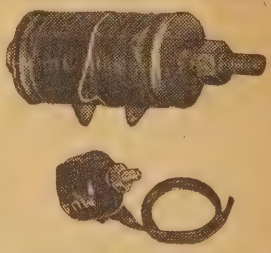

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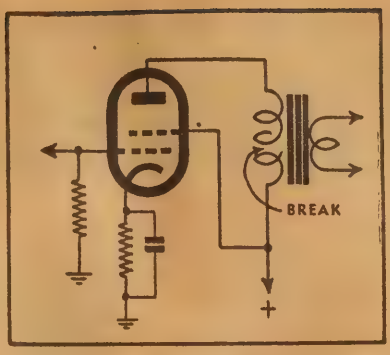
Nor am I being morbid. The sticky fumes can penetrate coils, IF transformers and every odd corner of a chassis. And no Paris perfume can linger longer than the odor of burning power "tranny." I have seen more than one instance of a receiver having to be dismantled completely, the chassis resprayed, the components individually cleaned, and the whole job rewired from start to finish. Only when the inside of the cabinet has been cleaned and resprayed is the set fit to take its place again in the respectable lounge-room.

FIRST FILTER RATING

Getting back to more technical ground, I always make a practice of replacing the first filter condenser with a 600 volt type, when available. The extra cost is very small when compared with the safety factor it affords. If there is any suggestion of high mains voltage, connection can be made to the 260 volt tapping on the power transformer, which will reduce the peak voltages without noticeably affecting the performance of the set.

Yet another course which will increase the safety factor is to use a 5V4-G or 83V indirectly heated rectifier and insert a 5-watt resistor of about 200 ohms between the cathode of the rectifier and the input to the



A broken down loudspeaker winding will result in excessive screen dissipation and probably a ruined valve.

filter system. The slower heating cathode gives the other valves a chance to draw current before full voltage is applied to the filter condensers.

Failure of the second filter condenser has hitherto been attended generally by no very serious complications. The resistance of the usual field-coil filter system is sufficient to limit the short-circuit current to more reasonable proportions. The rectifier, power transformer and field coil could become hot enough to do damage, but the process is usually slow enough not to reach these proportions before the set is switched off.

With low resistance choke filtering a breakdown in the second filter condenser would impose a heavier load on the rectifier but, fortunately, the peak voltages with the now-popular 285 volt transformers are not likely to endanger even a 525 volt electrolytic.

SPEAKER OPEN CIRCUIT

The second common fault I referred to is failure of the loudspeaker output transformer.

When this happens the pentode output valve is left with full voltage on the screen and none on the plate. The electrons, having nowhere else to go, are all collected by the screen, which proceeds to glow a bright cherry red. That is another danger sign a serviceman looks for during his first inspection of a set.

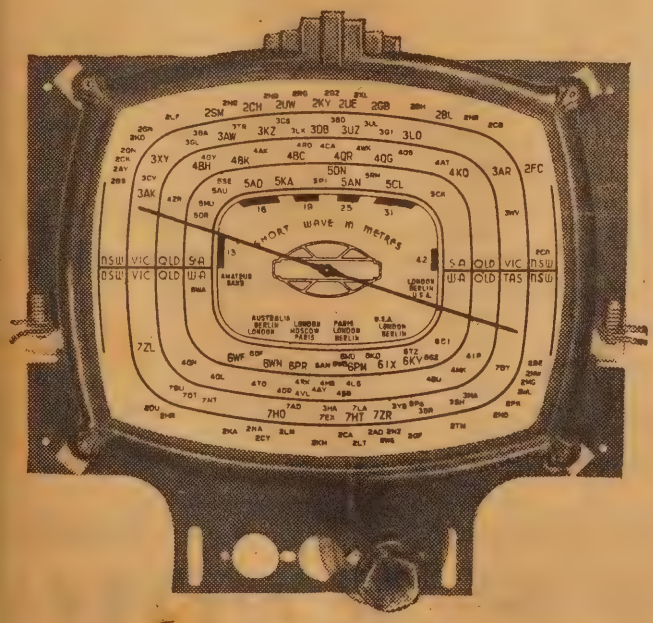
The results of this are generally not as drastic as trouble in the power supply, but they can still mean something in terms of £sd. Even a couple of minutes operation with the screen glowing red may not harm some output valves and, once the necessary repair is made, they operate again quite merrily.

But it sometimes happens that severe overheating of the screen and adjacent grids by this unnatural condition causes gas to be driven out from the metal wires and the valve begins to show the peculiarities of a gassy valve. Its demise, if not immediate, is at least hastened.

Milk, long regarded as good for teeth because of high calcium content, also helps prevent decay, it is now claimed.

Here it is!

THE CD-31



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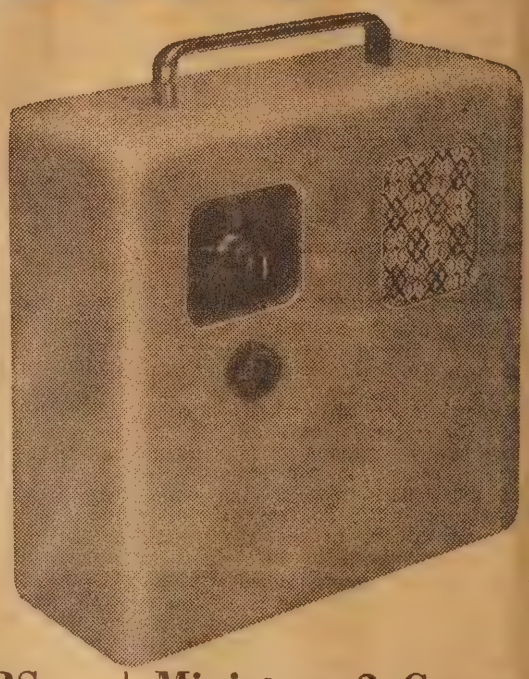

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CALIBRATING A SERVICE OSCILLATOR

HALF the value of a modulated oscillator is lost if one knows only a half dozen spot frequencies in the tuning range. So regard the calibration as an essential part of the project and resist the temptation to tackle it later on. That way you may never get around to it.

Before you make any attempt at calibration, see to it that the constructional work on the instrument is completed, that the dial screws are tight, the modulation satisfactory and that nothing further need be done which is likely to affect the calibration.

The original instrument was fitted with a planetary drive knob and a celluloid cursor traversing a 180-degree dial scale. This scale was cut from white cardboard and punched so that it mounted positively by three bolts passing through the front panel. Many readers have indicated their intention of duplicating this scheme.

PREPARING A SCALE

To prepare the scale, pin the cardboard to your drawing board or table and with a compass draw five concentric half-circles, such that they occupy conveniently the space between the control knob and the outer limit of the front panel. You can call the scales A, B, C, D and E, and mark the wave-change switch to correspond.

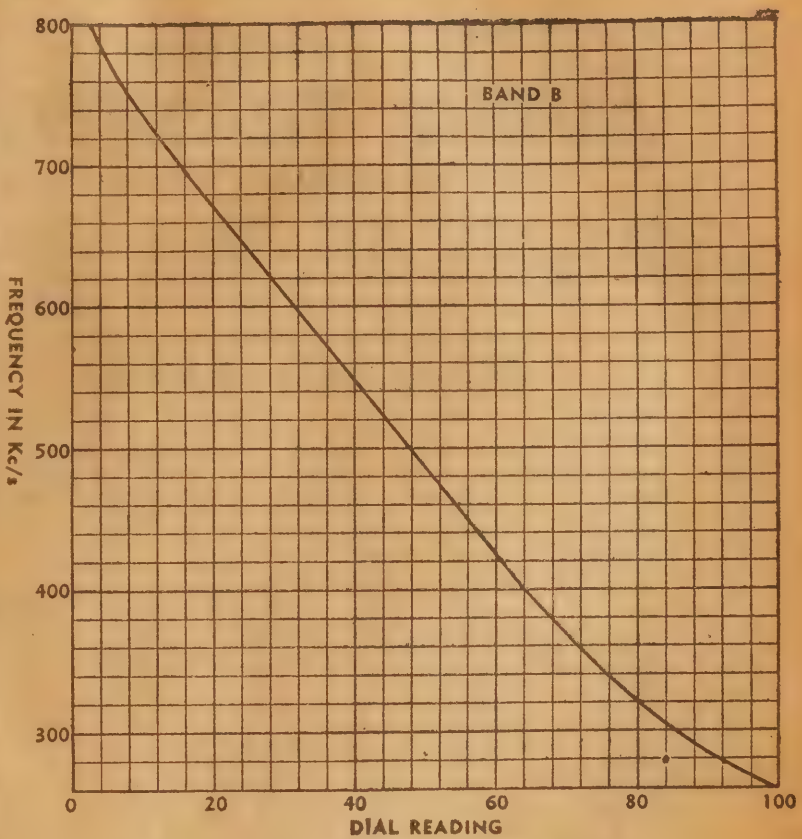
It is suggested that the outer scale be used for the short-wave calibrations, working inwards to the low frequency bands. It is well to complete the basic design neatly in black ink, leaving only the graduations and figures to be added. These should be put in initially in soft pencil. After calibration, the scale can be removed temporarily from the instrument and the graduations and figures inked in as necessary.

This procedure allows for corrections and interpolation and treatment with a gum rubber will remove all traces of the pencil markings. The scale card can then be reinstalled on the instrument with a celluloid cover to protect it from wear and dirt.

CALIBRATION

Some constructors may, of course, have elected to use a dial with a simple 0-100 scale and not suitable for direct calibration in terms of frequency. The procedure then is to draw a set of calibration curves, one for each band, plotting frequency against dial setting. One soon memorises the important spot frequencies, such as 175 and 455 kc's, but other frequencies can be ascertained quite simply by referring back to the curves and reading off the dial setting.

One can strike a useful compromise between direct and graphical calibration by drawing semi-circular scales for the five bands, with a conventional 0-100 scale around the outer edge. A set of curves can then be drawn,



A typical calibration curve for an oscillator.

Our correspondence has reflected a lively interest in the modulated oscillators described in the April and May issues. This article will give you a few hints on calibrating the instruments—a job which is just as important as the actual construction.

showing frequency against the numerical scale. By removing the scale, important frequencies in each band can then be marked in conveniently on the inner rings by running a straight-edge between the appropriate point on the numerical scale and the centre of the dial card.

Much care is necessary in doing this, as errors in plotting tend to be multiplied as they are transferred from the dial to the graph and then back to the dial.

GENERAL

At this stage a few general remarks may be in order regarding the drawing of curves. For the purpose, a few sheets of "squared" paper will be required, as commonly found in science exercise books.

The exact scale does not matter very much, but a common and convenient ruling has the paper divided each way into inches, subdivided into tenths. Ten inches along the horizontal scale would thus embrace 100 small divisions, and each of these might correspond to a division of the dial scale. Or, if the dial is calibrated from 0 to 180, the graph can be made nine inches long, with each tenth-inch representing two divisions on the dial.

Frequency can be plotted along the vertical scale, and, once again, one has to choose a convenient relationship which will give a scale of suitable length, yet easily related to the frequency range to be covered.

For the sake of accuracy, it is wise to plot as many points as can be arranged, making sure that each point is properly located, both in terms of dial reading and graph position. Care is especially necessary where points have to be plotted in the spaces between lines—in other words, where interpolation is necessary.

METHOD

Before calibration can proceed, it is more or less essential to have on hand a good dual-wave receiver or, better still, a triple band job covering the broadcast and two short-wave bands. This is necessary before any com

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The modulator unit described in last issue of Radio & Hobbies uses Ferguson's Audio Transformers Type IP2 (class AB2 driver) and M50 (modulation) in its construction. Both types are in service in many Ham Stations today, giving excellent results. Listed below are the standard range types of Audio Transformers which we are now manufacturing.

STANDARD RANGE TYPES

TYPE	PRIMARY	SECONDARY	RATING
OP-1	5000 ohms & 2500 ohms S.E.	12.5 ohms tap 8 ohms & 2.3 V.C.	10W
OP-1A	5000 ohms & 2500 ohms S.E.	500 ohm Line	10W
OP-2	5000 ohms P-P	12.5 ohms tpd. 8 ohms tpd. 2.3 ohms V.C.	15W
OP-3	6600 ohms P-P	" " "	15W
OP-4	10,000 ohms P-P	" " "	15W
OP-5	5000, 6600, 10,000 ohms P-P	" " "	15W
OP-6	5000 ohms P-P	500 ohms 250 ohms 125 ohms	15W
OP-7	6600 ohms P-P	" " "	15W
OP-8	10,000 ohms P-P	" " "	15W
OP-9	5000, 6600 10,000 ohms P-P	" " "	15W
OP-10	5000 ohms P-P	" " "	25W
OP-11	6600 ohms P-P	" " "	25W
OP-12	10,000 ohms P-P	" " "	25W
OP-13	5000, 6600, 10,000 ohms P-P	" " "	25W
OP-14	5000 ohms P-P	" " "	32W
OP-15	6600 ohms P-P	" " "	32W
OP-16	10,000 ohms P-P	" " "	32W
OP-17	5000, 6600,10,000 ohms P-P	" " "	32W
OP-18	3800 ohms P-P	" " "	60W
OP-19A	5000 ohms P-P	12.5 ohms tpd., 8 ohms tpd. 2.3 ohms V.C. Hi-Fi	15W
OP-19B	5000 ohms P-P	500 ohms, 250 ohms, 125 ohms, Hi-Fi	15W
OP-20	11,600 ohms, 8400 ohms P-P	500, 250, 166, 125 ohms	150W
OP-21	8000 ohms P-P	500, 250, 125 ohms	15W
OP-8M	10,000 ohms P-P	500 ohm line 10 tappings	15W
OP-15M	6600 ohms P-P	" " " "	32W
IP-1	6J7G triode	CLASS A1, AB1 grid driver	
IP-2	6V6G "	CLASS AB2 grid driver 807 etc.	
IP-3	(45's P-P A or AB1)	CLASS B GRID DRIVER. 800, 808, 809, 830B, etc.	
	(2A3's P-P A or AB1)	PRIM / ½ sec. RATIO — — 2, 3, or 4	10W
U1	30,000 ohms, 20,000 ohms, 14,000 ohms 10,000 ohms, 7,000 ohms, 5,000 ohms 2,500 ohms P-P or S.E.	2.3 ohms	10W
M50	3,800 ohms, 6,600 ohms, 8.000 ohms P-P MODULATION TRANSFORMER	10,000 ohms, 7500 ohms 6500 ohms, 5500 ohms 4500 ohms, 3500 ohms	50W

VIBRATOR TRANSFORMERS

6V/150	6V 0.9A	150 — — — 25MA
6V/200	6V 2.9A	200 — — — 50MA
6V/250	6V 3.4A	250 — — — 60MA

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arison can be made between the output of the oscillator and other signals f known frequency.

It is also helpful, although not absolutely essential, if access is available o a ready calibrated oscillator. Even ! the second oscillator is not absolute n its accuracy, it allows one to plot he general layout of the calibration urves and therefore to avoid possible onfusion with harmonics, &c. Curves lrawn by comparison with another scillator can be corrected easily nough by checking them against roadcast stations whose frequency is nown accurately.

When using the coil from a 465kc F transformer, the original oscillator uned over the frequency range of rom 275 to 800kc. It is suggested that his band be calibrated first, leaving he more difficult bands till later. Begin by screwing the trimmer to about alf its normal capacitance, set the scillator gang fully out of mesh and une in the signal on your broadcast eceiver.

USING RECEIVER

If the receiver dial is calibrated directly in terms of kilocycles, you will be able to read off the oscillator frequency with a fair degree of accuracy. It is a good idea to check over the alignment of the receiver in use to make it track as accurately as possible with the dial calibrations. Or, if the receiver has a purely numerical scale, it is worth while to draw a calibration curve for it to allow you to note at a glance the frequency to which it is tuned.

Now re-set the receiver to the first known broadcast station lower in frequency and reduce the frequency of the oscillator gradually until a clear beat note is heard between the oscillator and the broadcast station. Experiment with the aerial and the coupling from the oscillator to obtain a clear beat note, and, if necessary, switch off the modulation.

Check the frequency of the broadcast station and plot the appropriate point on the graph. Alternatively, if you are calibrating the dial scale directly, lift up the celluloid cursor and mark the point carefully with a soft pencil. For direct calibration it will simplify matters considerably to pick as many stations as possible on the even hundreds of kc's.

Exactly the same procedure is followed when calibrating the oscillator against another instrument. Set the second instrument to, say, 800kc, tune the unmodulated signal on the receiver and adjust the new oscillator to produce zero beat. In this way the receiver is used purely as a means of comparison between the two frequencies and has no bearing on the accuracy of calibration.

USING HARMONICS

Following this general procedure, the graph can be plotted down to approximately 550kc, which represents the lowest frequency limit of the average receiver.

However, by turning up the output of the oscillator, you should be able to receive the second harmonic of 500kc at 1000kc on the receiver dial. This second harmonic can be compared with broadcast station frequencies in exactly the same way. Remember to halve the frequency plot on the graph each time, since you are now working on the second harmonic.

In this way it should be possible to calibrate the oscillator down to about 275kc, which represents the normal limit of this band on the instrument. If necessary, however, you can carry on the process beyond 275kc by transferring attentions to the third harmonic, which occurs at three times the fundamental frequency.

The next band in the original instrument tuned to a lower limit of 750kc, thereby overlapping the other band by a small amount. Set the trimmer on this band to about half the normal capacitance, the oscillator tuning gang fully in mesh and tune in the signal on the receiver.

HIGHER FREQUENCIES

Then, following the same technique of comparison with broadcast stations or another oscillator, turn the oscillator gang gradually out of mesh, calibrating the dial or graph as you go. This procedure can be followed to approximately 1600 kc, which represents the upper tuning limit of the average broadcast receiver. Very few receivers have provision for tuning immediately above this band, although frequencies around 1900kc are becoming important in the adjustment of some communications type receivers.

We overcame this difficulty by working on the second spot effect, which is apparent with ordinary superhet. receivers. If the IF channel is set accurately to 455kc, then the second spot will occur at 930kc above the correct reception point.

Assuming that you have calibrated the oscillator down to 1600kc, it should be possible to receive the image of the signal by leaving the oscillator set and retuning the receiver to 670kc. The signal frequency circuits of the set will naturally tend to reject the image at this frequency, but it should still be audible if the oscillator output is turned up towards maximum and the output lead clipped on to the grid lead of the converter valve.

FOLLOWING IMAGE

Connection to the aerial terminal may be adequate with an ordinary 4-5 valve superhet., provided the oscillator output is turned up to maximum. You can then follow the image down in frequency, remembering to add 930kc each time to the receiver reading. This method can be quite accurate if the IF channel is adjusted beforehand and, by employing it, we were able to calibrate the original oscillator up to 2100kc, which represented the upper frequency limit of this band.

Next operation is to calibrate the low frequency band, which, in the original instrument extended from approximately 125 to 300kc. Set the band trimmer to its mid position and the oscillator tuning gang fully out of mesh. Now turn the output of the oscillator well up and tune across the broadcast band with the receiver dial. In so doing, you should be able to hear harmonics of the oscillator frequency spaced at more or less regular intervals, some stronger than others.

In the original instrument, the highest frequency from this band was about 300kc, so that harmonics were tuned at approximately 300kc intervals. This is where calibration of the receiver dial is particularly useful. By observing the spacing of the harmonics, one can gauge quite definitely the output frequency of the oscillator.

FOURTH HARMONIC

Using this method, set the oscillator to 300kc or 275kc or some other simple figure, and then tune in a strong harmonic. Thus the fourth harmonic would occur on 1200kc or four times the particular frequency to which the oscillator is set.

Calibration can then proceed in the usual way, dividing the receiver dial reading each time by four.

It is possible that the strength of the harmonic selected may diminish drastically at some particular point on the dial, but it is a simple matter to transfer attentions to the next harmonic, dividing the receiver dial reading by five, instead of four.

By this means, it should be possible to calibrate the low frequency range down to the lower limit, which is generally about 125kc.

Calibration on the short-wave bands presents considerably more difficulty, since it is complicated by the image effect common in most dual-wave receivers. If the receiver dial is left set, two signals can be heard from the oscillator a few degrees apart, and the only way of differentiating between the real signal and the image is to turn the oscillator output as low as possible, under which conditions the difference in level should be apparent.

R. & H. 1947 CALL-SIGN BOOK

WE are planning to produce at an early date the 1947 edition of our call-sign book, the last of which appeared before the war.

The book will contain lists of Australian, and probably New Zealand, amateurs, short-wave broadcast stations of the world, broadcast band stations operating in Australia, and a list of those overseas broadcast stations which are frequently heard here.

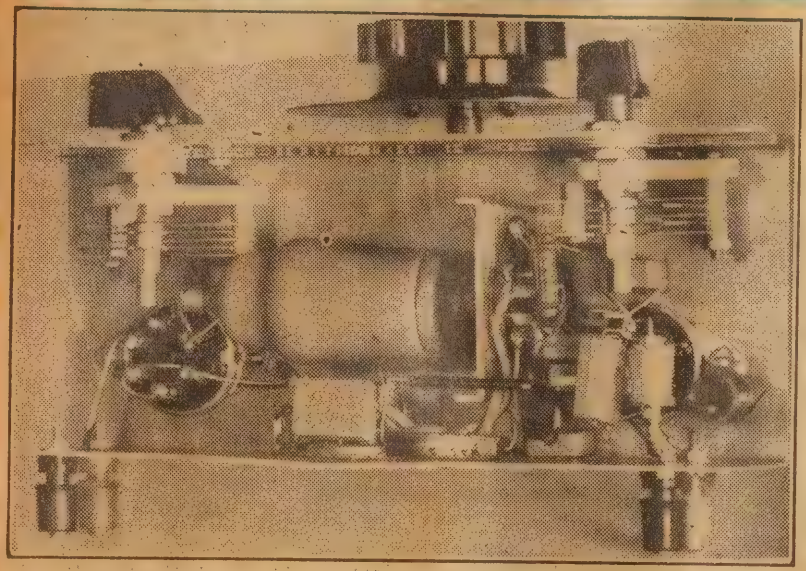
In addition, there will be articles on short-wave receivers and transmitters, plus valuable technical data, making the book a splendid reference for all interested in radio.

If you are an amateur, and have an alteration to your call-sign or address you would like included, write to us, marking the envelope "Call Sign." In it, give details, set out in block letters as under:—

VK2JU—J. M. MOYLE, 60-70 ELIZABETH-STREET, SYDNEY.

If you are a new amateur, make sure you send us details for inclusion in the book.

MORE ABOUT SIMPLE 6-METRE GEAR



Here is an under-chassis view of the converter with all major components in view. The ECH-35 is supported on a metal bracket, and the small parts are grouped round it. Note the output coupling coil and its trimming condenser.

Continuing this series of articles on U.H.F. apparatus, we give this month some details of a very simple 6-metre converter which can be easily built, and which will give excellent results when used in conjuction with a short-wave receiver capable of being tuned to 10 mcs. which is the nominal I.F. used.

THE converter is no more than the front end of the receiver described last month, with a small output coupling coil wired in place of the first IF transformer.

We built it on a small chassis 8½in. x 3½in. x 2½in. deep. If you add 1in. to the 3½in. measurement, you will have a little more room to mount the components grouped round the valve socket, and your wiring will be made easier.

The front panel measures 9½in. x 7in. The photograph taken from beneath the chassis shows the general placement of the band-set condensers and the valve. The latter is mounted on its side to allow very short leads in all the tuned circuits. This is quite a point on these frequencies.

The oscillator circuit uses plate tuning, which we have found preferable to grid tuning, mainly in the matter of freedom from "pulling" between oscillator and signal circuits. There is very little of this to be found with the converter. When the signal is tuned in with the band-spreader, the aerial trimmer is peaked with practically no detuning of the signal itself. This is largely due also to the use of a comparatively high IF as against the 465 kc for the ordinary short-wave set.

In the interests of stability, all earth returns for bypass condensers, &c., associated with this section of the circuit should be made to one point. Use the smallest components you can get, as this will facilitate fitting them in with the shortest possible leads.

Band-spreading is obtained by tapping down the oscillator coil with the condenser attached to the tuning dial. The tap is placed just far enough up from the low potential end of the coil to give the degree of bandspread required. Some experiment will probably be needed in this connection, although the coil details we have given should work out pretty well if all other circuit constants are the same. The lead to this condenser will be longer than the others, but this isn't such an important matter in the oscillator circuit which operates on fairly high C in any case. It would be much worse were it in the aerial circuit.

You will find connections to the aerial coil very much shorter. The coils themselves may be made to plu in, as we have done, or they may b soldered permanently in place if de sired. Old valve bases may be use here, or, better still, trolitul coi plugs, which should by now be avail able in the radio stores. The latte need a little care in soldering to th pins to avoid melting the trolitul.

The output coupling coil is tune with a 3-35 air-dielectric trimmer The procedure is to connect the con verter when wired up, having firs tuned the short-wave set to approxi mately 10 mc. Place a temporary shor circuit between the oscillator tunin condenser plates, and adjust the 3-3 trimmer until the maximum noise leve is heard in the set. Remove the short and with the oscillator condenser abou halfway meshed, you should be able t peak the aerial trimmer on noise level or on a station, if you are lucky enough to strike one straight away The oscillator band-set is adjusted s that the tuning range of the dia covers all the stations on the band Slight adjustments to the aerial trim mer will be needed when tuning from one end of the band to the other.

It is a good plan to adjust the feedback coil for the oscillator until a milliameter connected between the "cold" end of the oscillator grid leak and earth reads about 150 microamps, or .15 mills. A figure of 200 microamps is the optimum value, but the oscillator may super-regenerate before this figure is reached. In any case, it should not be less than about 100 microamps.

The power for the converter is obtained from the receiver itself via a plug and socket at the back of the converter.

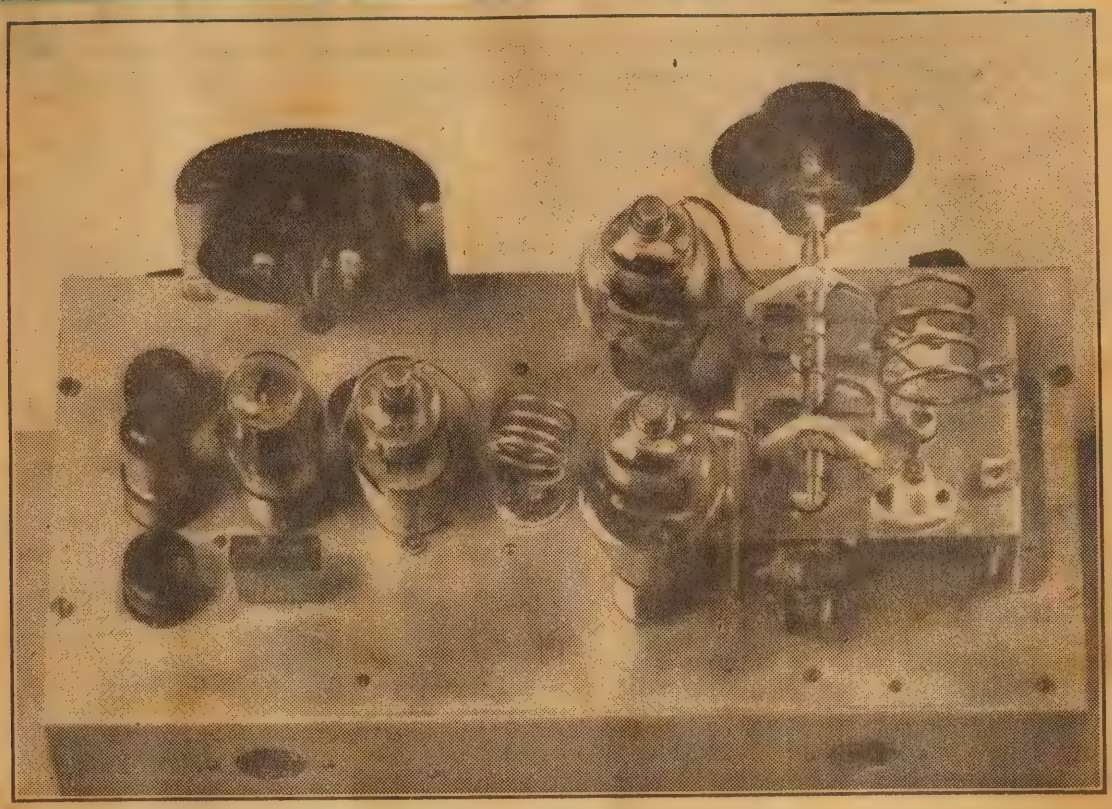
Any good panel-mounting vernier dial will do for tuning. The aerial grid coil has seven turns of 18-gauge wire ¼in. in diameter, and the aerial coil itself about four turns closely coupled to it at the earthed end. The oscillator coil has six turns of the same gauge and diameter, with a feedback coil of four turns closely coupled. This coil should be reversed if the oscillator refuses to "gee." The coils are substantially the same as for the set described last month. The tap may be made provisionally about halfway up the oscillator coil.

The 10 kc. coupling coil is wound on a 3-8in. former with 30-32 gauge wire. The larger coil has 25 turns, and the output coil 10 turns. Both are close wound. Connections are to plate, earth, earth and output terminal, in that order.

Incidentally, the use of 1.9 kc. I.F.'s in last month's 5-valve set, and an 1852/6AC7 or an EF50 as the I.F. amplifier, will give you all the gain you require, plus freedom from pulling, acoustic feedback, and easier tuning, because of the lowered selec-

by John Moyle VK2JU

LAYOUT FOR 4-STAGE PUSH PULL TRANSMITTER



Here is the transmitter referred to in the article. It is built on a standard 17-inch chassis, and all coils are plug-in. The plate coil of the doubler is here mounted under the chassis to avoid feedback, although a large coil can could have been used to shield it. The layout is equally suitable for low frequency transmitters owing to the plug-in coils being used.

ivity. We have found no need for wo I.F. stages under these condi-ions. You will find it a big im-provement over the use of a single 165 kc. stage. The 6SK7 will hardly give enough gain with the new inter-mediate frequency.

The 6J8G will give quite good results in this same circuit, but its characteris-tics are not as good as those of the ECH-35, particularly in conversion ef-ficiency. In fact, at least one well-known and very capable amateur has obtained good results with this valve even on 166mc. Personally, we don't advise it on this band except for the experience, as the figures show much better efficiency by the use of acorns and other special valves.

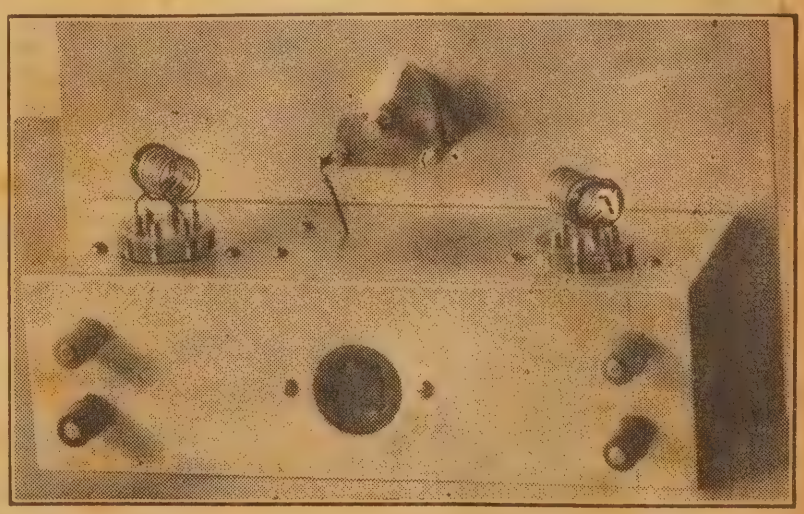
The 6K8 could also be used in a simple converter using a similar lay-out to the one described here. How-ever, as this valve is quite different in construction from the ECH-35 type, you may have to carry out some ex-periments of your own to get best results.

The intermediate frequency of 10kc. is not necessarily the only one you can use, but is generally accepted as being the most useful on all counts. If an-other frequency were to be employed, the characteristics of the coupling coils would of course be somewhat different, although there will probably be no need to alter the specifications of the tuning coils. The position of the oscil-ator band set would be different of course, but there is enough capacity in a circuit to take care of quite a selection of intermediate frequencies.

The same layout could be used with a pair of acorns, or better still, with a 6AC7 or EF50 as the mixer, and a conventional triode such as the 6C5 as an oscillator. In this case, the wiring would be different, and we suggest that straight grid injection be used. There is a good case for a cathode-tapped oscillator circuit, which allows the oscillator voltage to be taken from the oscillator cathode for mixing into the grid circuit.

In our next issue, we shall have some practical data on the use of such valves, also coil data and other relevant circuit constants. We have been doing a good deal of work on the subject in recent months.

We show here a photograph of a



A rear view of the converter showing the bandspread condenser and the plug-in coils.

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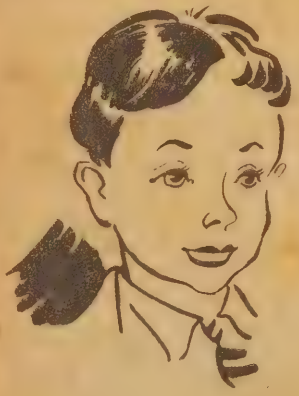

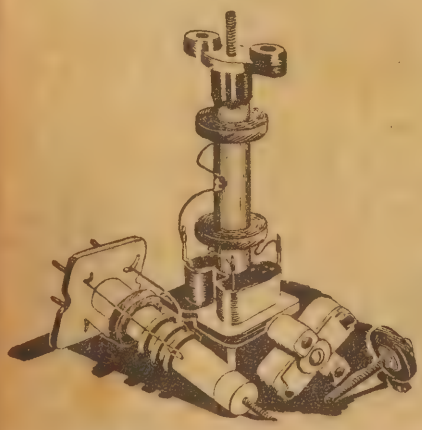

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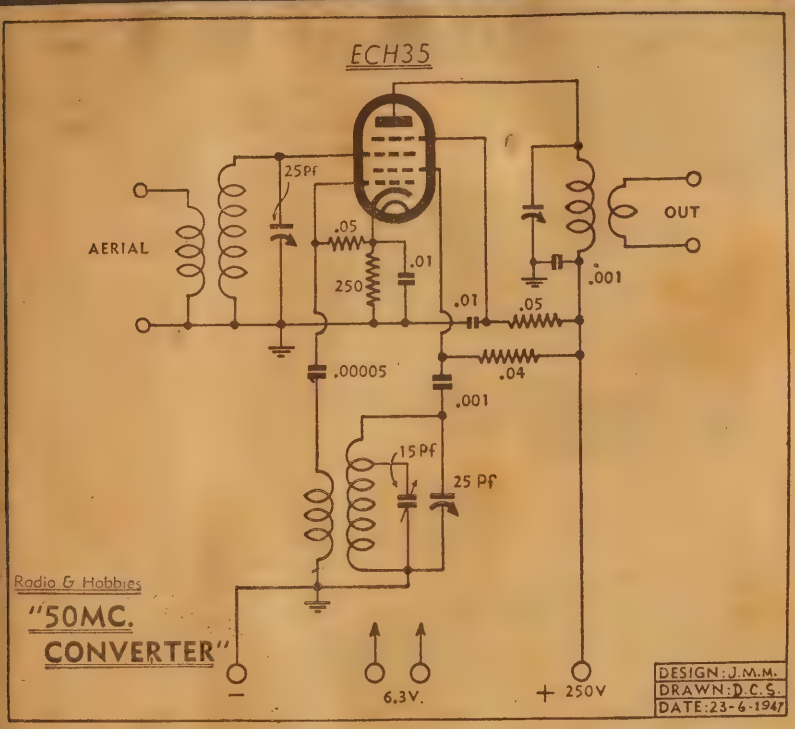
SIX-METRE CONVERTER CIRCUIT



Complete simplicity is a feature of the converter circuit. In last month's issue, a sketch of coil connections was given. Although the makers advise an oscillator plate feed resistor of .04 meg., we found it easier to obtain satisfactory grid current with .02 meg.

new transmitter we are just ready to try out for 6 metres. Essentially it is last month's transmitter with a push-pull 809 stage added. The layout is equally suitable for a single-ended job using a single 809, of the type we have used so successfully for some time at VK2JU. It has a 6V6G, tritet tripler, a 6V6G, or better still, a 6L6G doubler, driving an 807 amplifier. Using a split plate coil, this valve drives the 809's in push-pull.

The final stage is built on a metal bracket which supports the split-stator tank condenser and tank coil. Underneath the bracket, and mounted on the same bolts as hold down the tuning condenser, are the neutralising condensers. Feed-through insulators of course are used in this connection. The picture shows quite clearly the short leads which result.

The 807 runs on about 450 volts, or more if extra drive is required, and the 809's at present have 600 volts, giving an input of 100 watts without trouble. They neutralise perfectly, and there is enough output to light a 60 watt globe to full brilliance. Standing current of the 809's is about 100 mills.

We hope to give the circuit diagram of this transmitter in our next issue, together with some further details on a converter, and converter valve operation on 6 metres. The new converter will be a larger job using an R.F. stage and one I.F. stage, and gives somewhat better performance than the smaller one detailed here.

With all these receivers, converters, and transmitter, it is essential to use a good aerial. A simple co-axially fed dipole will do quite well at least for a start. But you will be disappointed if you think your present 20 or 40 metre aerial will be just as good. Try it and see!

A VACANCY ON R. & H. STAFF

WE have a vacancy on the staff of "Radio and Hobbies" for a technical journalist. Qualifications include good all-round experience and knowledge of radio receivers, with the ability to design, build, and describe them. The pages of our magazine illustrate the type of work to be done. An amateur licence and experience with transmitters would be an advantage. Working conditions are good, and there are prospects for advancement. Apply by letter in the first instance to the Editor, Radio and Hobbies, 60-70 Elizabeth-st., Sydney giving details of age, experience, and salary required. References may be sent, but copies only. Suitable applicants will be given appointments for interview.

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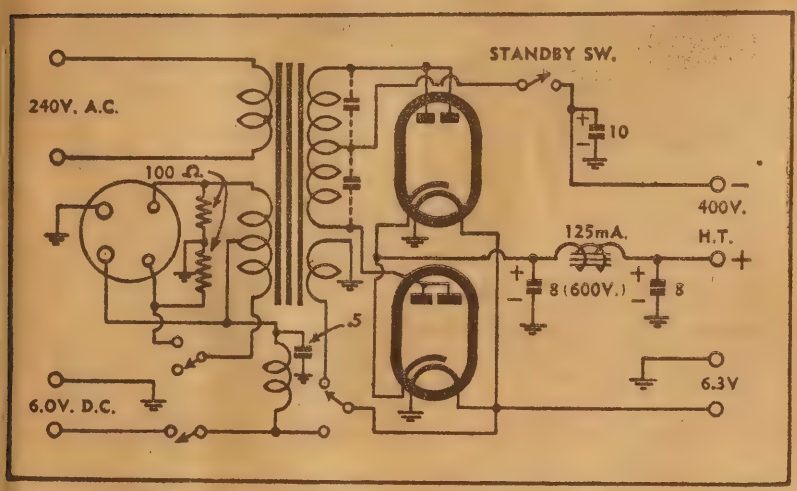
A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

H.T. SUPPLY FROM MAINS OR BATTERY



Prompted by an earlier reference in these columns to vibrator power supplies, a reader from Gladesville, NSW, sends in this circuit for a power supply operating from either the 240 volt a-c mains or from a 6-volt accumulator.

THE reader is Mr. C. Jones, of 24 Wharf-road, Gladesville, who has the unit in service and finds it very satisfactory.

A special power transformer is required with the usual 240-volt primary and another centre-tapped primary intended for use with vibrator input from a 6-volt accumulator. The high tension secondary can conveniently be rated at 385 volts per side, 125 milliamps, and one 6.3 volt filament winding is also required.

Two 6X5-GT rectifiers are desirable to handle the full high tension, and a single section condenser input filter smooths out the a-c ripple.

Switching is necessary to change from mains to battery operation, and this can be arranged in any convenient fashion. For mains operation, the 240-volt a-c input is connected to the appropriate primary winding. With the switch in the a-c position, the vibrator should be disconnected from the 6-volt primary and the heater supply from the amplifier transferred to the 6.3 volt secondary winding on the power transformer. The circuit then operates as a conventional a-c power supply.

For vibrator operation, the switch is thrown in the opposite direction and the amplifier connected to a 6-volt heavy duty accumulator. As a protection for the equipment, the same switching operation may be arranged to make the primary circuit to the 6-volt source, and to break any possible connection with the a-c power mains. This would naturally entail the choice of a suitable switch.

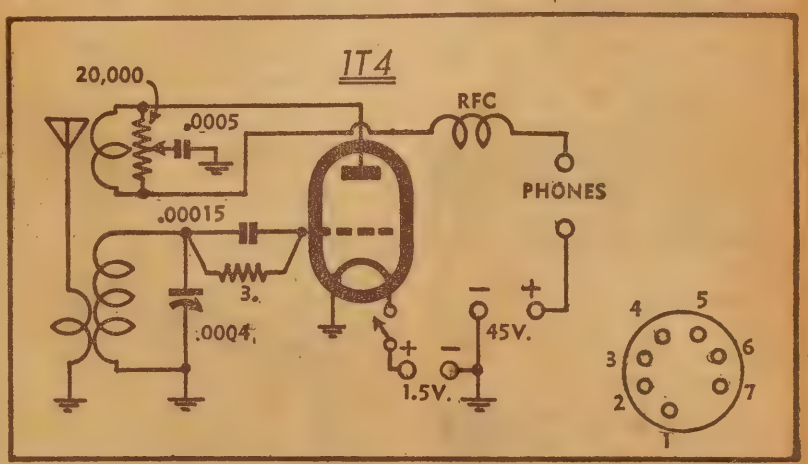
In the d-c position, the heaters are connected straight through to the batteries, while the circuit is also completed through the vibrator cartridge and the 6-volt primary winding. Buffer condensers are desirable across the secondary winding, typical condensers being .01mfd. high voltage mica units.

The RF choke consists of 40 turns of No. 14 gauge wire wound in two layers on a 5-8in. diameter former.

The buffer condensers should ideally be selected with the aid of a cathode ray oscillograph, the values being chosen which give a wave-form as free as possible from transient peaks. The condensers will not normally affect the operation on a-c power mains.

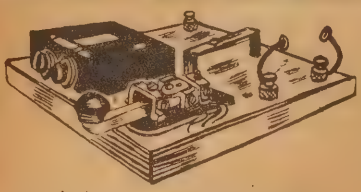
Mr. Jones suggests using a vibrator type 825 or 294.

MINIATURE 1-VALVE SET



Mr. W. R. Woolven, of 6 Bronte-road, Bondi Junction, NSW, built up this one-valve receiver using the 1T4 midget RF pentode. It tunes the local stations with good volume and may be of interest to other readers. By using an unshielded "Reinartz" coil and one section of the new midget 2-gang condenser, very small overall size could be achieved. The valve socket is of the button type, and reaction is controlled by a 20,000 ohm carbon potentiometer. Filament supply can be from a single 1.5 volt cell, with a 45 volt or 67.5 volt Minimax B-battery for the high tension.

BARGAIN RELEASES



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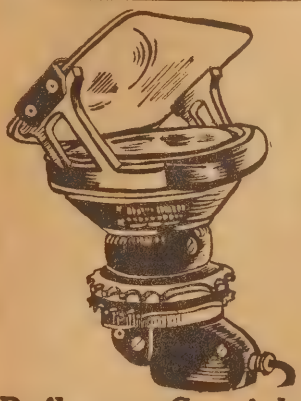

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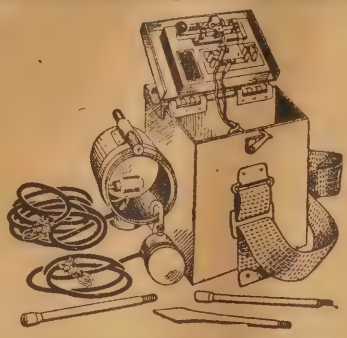

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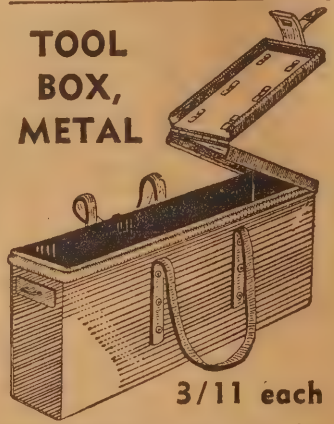

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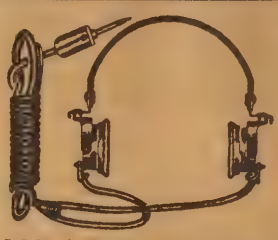

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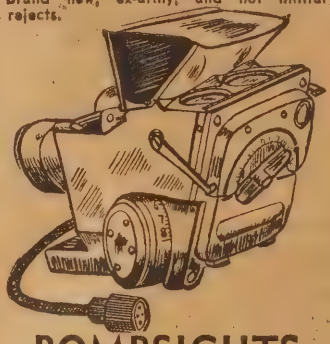

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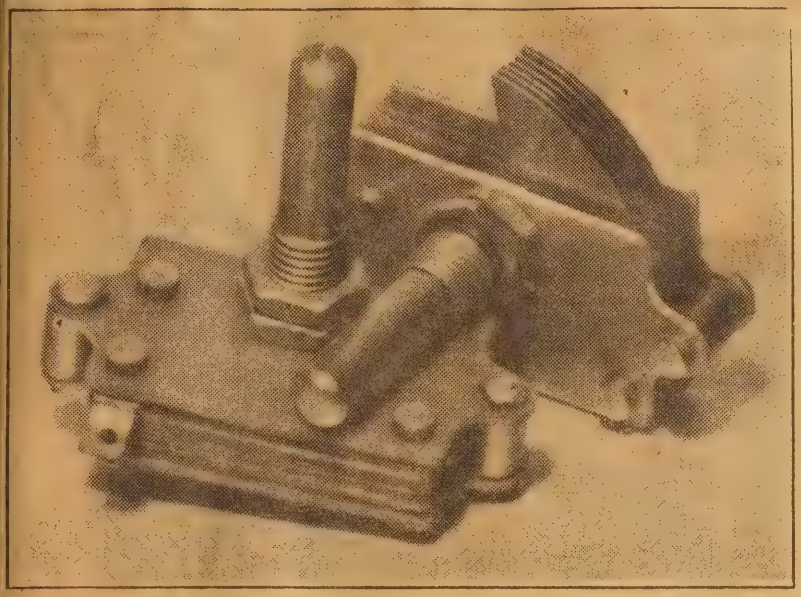
TRADE NOTES AND REVIEWS



We have received from Ferguson and Nichols two samples of the single gang miniature tuning condenser which was promised some little time ago. As the more than life-size photo shows, it is of the same compact construction as marked the two-gang already released. Acutal size overall is only 2 inches by 7/8 inch by ½ inch deep, so that will have many applications in small sets. It should be particularly good in receivers such as the "Little Jims" and will allow them to be built up in a very small space. Condensers should be on the market any time now. F. N. Radio adivse that they have several other lines almost ready for release, particularly in the way of miniature components. The trade may be due for some surprises when they eventually hit the market.

AUTOMATIC KEY FOR THE AMATEUR

An Australian-made automatic key which has been well received is the "Codemaster," made by B. M. R. Products. In finish, workmanship, and performance, we found the "bug" to be a very good piece of work. It is handy in size, with enough weight in the base to make for smooth operation. Full adjustment is provided, each fitted with a generous milled locking nut. CW exponents should find this product well worth looking over.

HANDBOOKS ON RADIO

We have received a number of booklets published by the American journal "Radiocraft," dealing with various aspects of radio. Their handy size of 8½ x 5½ inches makes them just the thing for your radio bookshelf.

THE first is entitled "Handy Kinks and Short Cuts," which are useful ideas concerning Antennas, Power Supplies, Test Equipment, Servicing, Amplifiers, Coils and Transformers, &c.

Most of these have appeared in "Radiocraft," but will give you plenty of things to try out.

"Advanced Service Technique," with chapters covering RF circuits, Audio Circuits, Sound Equipment, Power Supplies, and Frequency Modulation, also contains some useful material, including a section dealing with Juke boxes.

The "Amplifier Builder's Guide" is a particularly good one, as it covers the full field from simple jobs to high-powered equipment, including such things as Feedback, Pick-up Equalising, Volume Expanders, Decibels, &c, as well as practical circuits.

"Radio Test Instruments" describes all kinds of equipment within the scope of the average enthusiast, but minus an oscilloscope, strange to say. However, signal Tracers, Multimeters, Capacity Bridges, Valve Checkers, Oscillators and Generators are all there, clearly set out and described.

"Elementary Radio Servicing" is of a more general nature than its companion booklet and covers more the methods of using equipment than how to make it or to use it in a specialised form. Signal tracers appear to be popular in America, and there is quite a bit about them in both booklets. Soldering Pitfalls, Planning the Service Shop, &c., are also covered with many helpful remarks.

"How to Build Radio Receivers" presents a number of fairly standard circuits for both shortwave and broadcast bands, taking in portables, hearing aids, and UHF circuits as well. This is one especially suited to the wants of the average home-builder whose appetite for such things we have found to be almost inexhaustible.

The "Amateur Radio Builder's Guide" is full of interest, although as with most American publications, many of its designs are of too high power to be useful in Australia. There are, however, articles on receivers and some low-powered gear which do apply to our conditions.

We do not know whether the books are available here as yet, although as they were published in USA some months ago, it should be possible to procure them soon. The American price for each is 50 cents.

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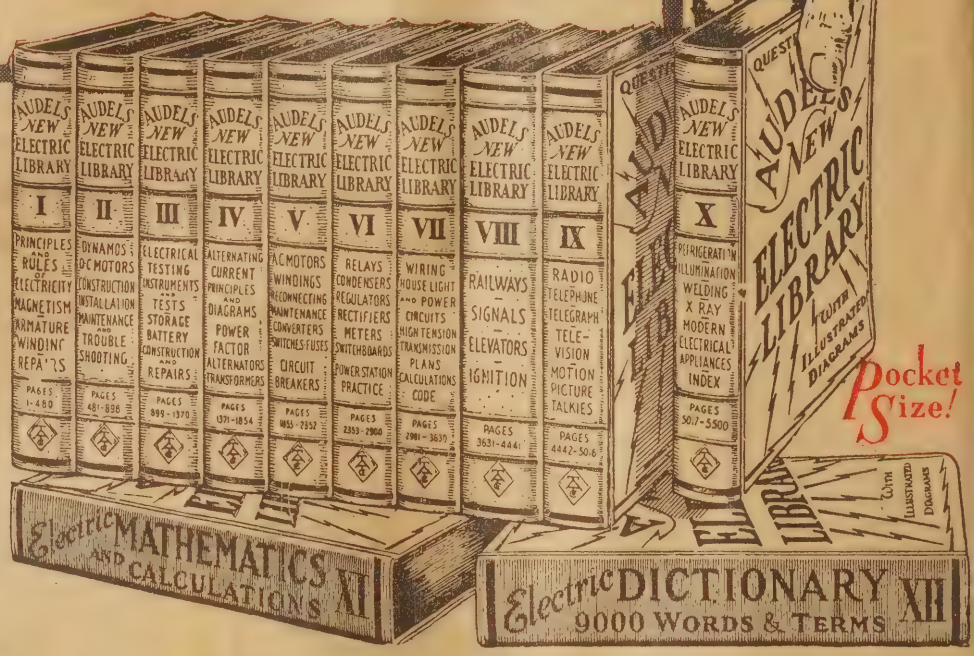
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NEW AEGIS COILS

We have been advised of some new Aegis intermediate frequency transformers which have recently been released by the Aegis Manufacturing Co., Pty. Ltd. of 208 Little Lonsdale St. Melbourne.

THERE are two types, one for medium selectivity, and the other for high selectivity. Both have been designed for standard two-stage IF channels.

Types J20 and J21, priced at 13/9 each, are the medium selectivity types. The curves show a decidedly flatter top than with the high selectivity pair, and at 80 db. down have a band-width of about 34 kc. total.

The types J22 and J23 have a sharper peak, and a total width of about 24kc. at 80db down. These are priced at 15/- each.

Both sets of transformers are iron-cored, and our experience of Aegis coils indicates that they will be true to label.

The main selling points made by Aegis are maximum stability consistent with gain, due attention paid to the matter of tube loadings, Miller effect, and of course, selectivity.

There is also a line of midget IF's which will shortly be ready for release. These are approximately one inch square and two inches in height. We are hopeful of obtaining details of these in time for review in our next issue.

Raymarts here again

THE English Raymart condensers, which won for themselves such a fine reputation before the war, are once more available in a wide variety of sizes. These range from small, wide-spaced jobs suitable for neutralising or U.H.F. work, to larger capacities up to 250 mmfds.

The samples we have received from John Martin reveal excellent mechanical and electrical features. The long front bearing feature of the Raymart is even more substantial than previously, reducing back-lash and side-play to a negligible fraction.

Raymart coil formers and other lines bearing the name are also on sale, and details may be obtained on application. Prices, too are reasonable.

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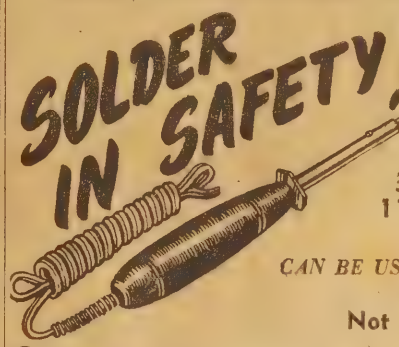

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60 Watt B.C.	2/10
240-12 Volt Transformers	52/11

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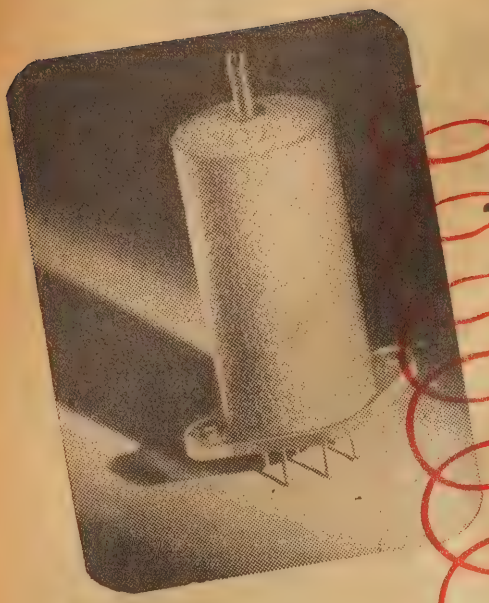
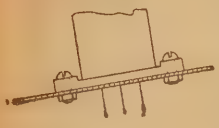
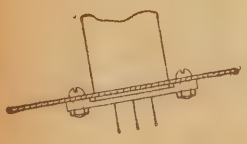


An Iron Clad Coil with a Higher "Q"

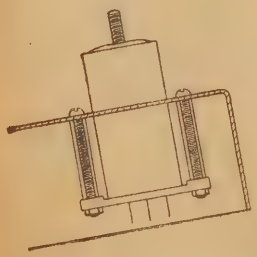
This new patented R.C.S. coil development offers radio technicians and set assemblers a miniature coil which fits the restricted dimensions of the modern mantel receiver, yet with a "Q" rating that assures peak performance. Interchangeable with standard coils, it is not a midget coil; but one that takes advantage of advanced designs. The secret of the performance rating of this new R.C.S. development is the patented magnetic iron "can." The cross section illustration below clearly shows this and other evidence of the superiority of this R.C.S. coil.



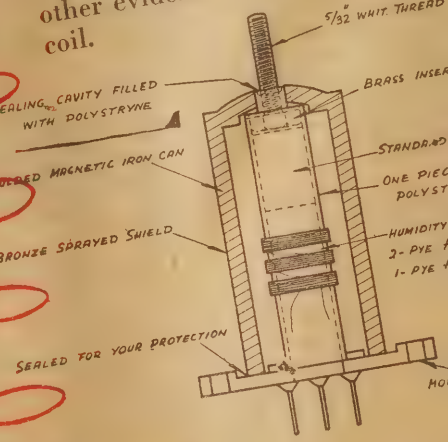
The new R.C.S. coil may be mounted on top of a chassis in the normal manner, the mounting being interchangeable with standard coil or valve socket.



This illustration shows the new R.C.S. unit mounted below the chassis.



Where space is a factor the coil unit may be mounted on spacers as shown.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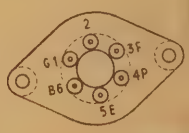

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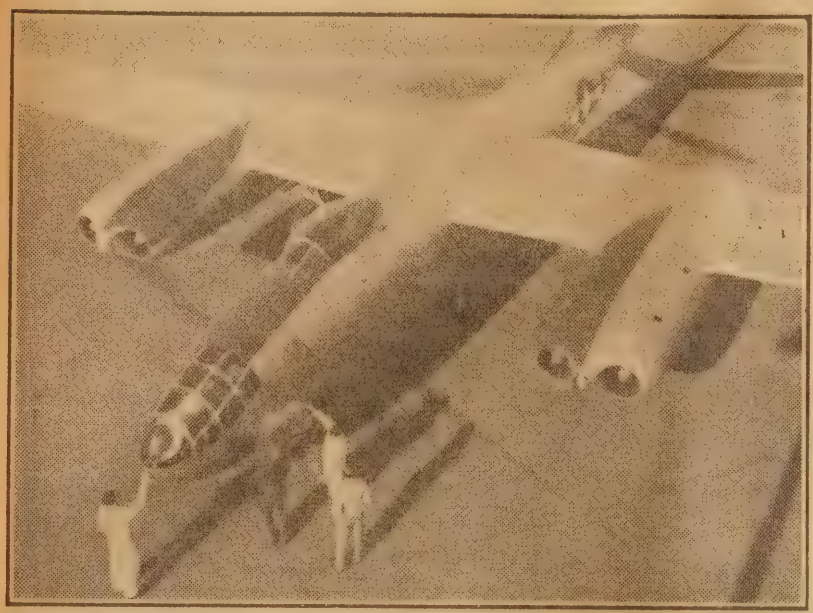
This new coil unit will shortly be available from your favorite retailer.

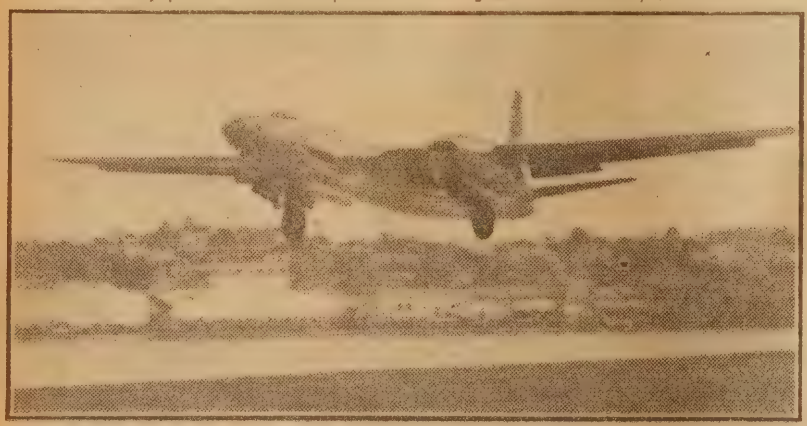
THE BUSINESS END OF A DUAL JET

This particularly fine close-up of a dual-jet engine shows the clean design possible as compared with the conventional piston engine. Note the large landing light situated between the dual vents. Obviously the jet turbine is long past the purely experimental stage

NEW U.S.A. BOMBERS MARK THE JET-POWER ERA



A top view of the B-45 shows a stream-line reminiscent of "peeps into the future" of many years ago. It illustrates the tendency to design aircraft as projectiles—a necessary point of view as speeds mount higher and efficiency increases.



The XB-46 shown just after take-off. The flaps are still partly down. In the original picture, the two hot gas streams from the jets created a definite "blurring" of the landscape immediately to the rear—an effect just discernible in the above illustration.

Another view of the B-45 gives a general idea of its design. This features a large stabilizer or fin, carried high to avoid the slip stream of the jet engines, the exhausts of which must be kept clear of all obstructions. It has a tricycle undercarriage and is entered from the nose.

These pictures constitute the first official views of the United States Army Air Force's first operational bombers utilising jet propulsion. In design and performance they can be considered as having rendered obsolete the familiar multi-engined, propeller-driven, aircraft of the war years.

THEY are the Consolidated Vult XB-46 and the North Americ B-45.

The four General Electric turbo engines powering the new bombers a arranged in pairs in single nacell on each wing. The turbo jet engi is a variation of the pure "jet" pri ciple and is generally considered representing the best principles a practice of the "jet era" as we kno it to date.

AHEAD OF WING

The engines are placed entire ahead of the wing leading edge f ease of accessibility and maintenanc In this connection, there are great reduced problems as compared wi piston engines, which in their fin form were complex, and used a lar number of moving parts. The tur jet reduces these considerably.

The XB-46 and the B-45 are hea bombers of World War II standar Their range approximates that of wa time heavies, but they carry a su stantially heavier load.

The XB-46 has a length of 105 fe 9 inches and a wingspan of 113 fe

The North-American B-45 has wing span of 89½ feet, is 74 feet lon and 25 feet high from ground to ta top.

HIGH SPEED

The significant development in mil tary aviation is that the B-45 and th XB-46 travel at a speed described b the US Army Air Force as "ex ceedingly high." It is unlikely tha exact figures concerning speed wi ever be released, at least not unt these types in their turn become obso lete. Published figures on militar aircraft at any time are apt to b most conservative, if available.

Exact performance and armamen data are likewise not yet made pub lic. In connection with armamen it is safe to assume that rocket pro jectiles will figure largely in th scheme of things, in addition to pro tective armament. The latest typ of guided missiles, also, will hav been provided for. Operational air craft are subject to so much modifi cation in this regard that, at th moment, it would probably be im possible to lay down any form o standard fitment.

Disposals Sales cannot go on forever

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Brand new thermo-coupled meters, as used in Army equipment. Mfd. by PATON. Two ranges available:— O/1 and O/.3 Amps **20/-**

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New high grade trimmers. Ceramic insulation, aluminum plates. Capacity approx. 30 mmF. **2/-**

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Telephone type, containing 22 heavy duty plated terminals on bakelite strip. Brand new. **5/-**

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These panels contain 2 Jacks, Sensitive Relay. Indicator lamp assembly and full wave Rectifier... NEW. **5/-**

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Heavy duty NAVY type keys, mounted on bakelite base 5½" x 3½". **5/-**

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Dynamic type units, very robust, will stand plenty of knocks. NEW impedance 45 ohms. Postage & packing, 6d extra. **10/-**

Standard carbon type inserts, postage, 6d extra. **2/6**

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Standard Army type rubber cords for double head sets. 5ft. long. Are not fitted with tips. Brand new. **6d.**

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Standard Army type, low impedance phones, complete with adjustable headband, cord, plug. NEW. **10/-**

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RELAYS

Standard type STC relays. Various resistances and contacts.

All brand new **10/-**

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DYNAMIC PHONES

Still a few pairs available. Double dynamic headphones complete with headband and cord. Impedance 90 ohms. Guaranteed brand new. Packing & postage 2/- extra. **15/6**

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Gas filled SYNCHRONOUS 6 VOLT type. Octal base. As used in FS6 power supplies. Unused & guaranteed **15/-**

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Telephone switchboard Indicator lamp holders. Can be used with standard screw dial or torch lamps. New **1/-**

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1 mF 1000V working. **5/-**

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Brand new No. 3 type carbon microphones, in bakelite case for hand use. Complete with cord and plug. **10/-**

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Selenium half wave. 50 m/A. NEW **2/-**

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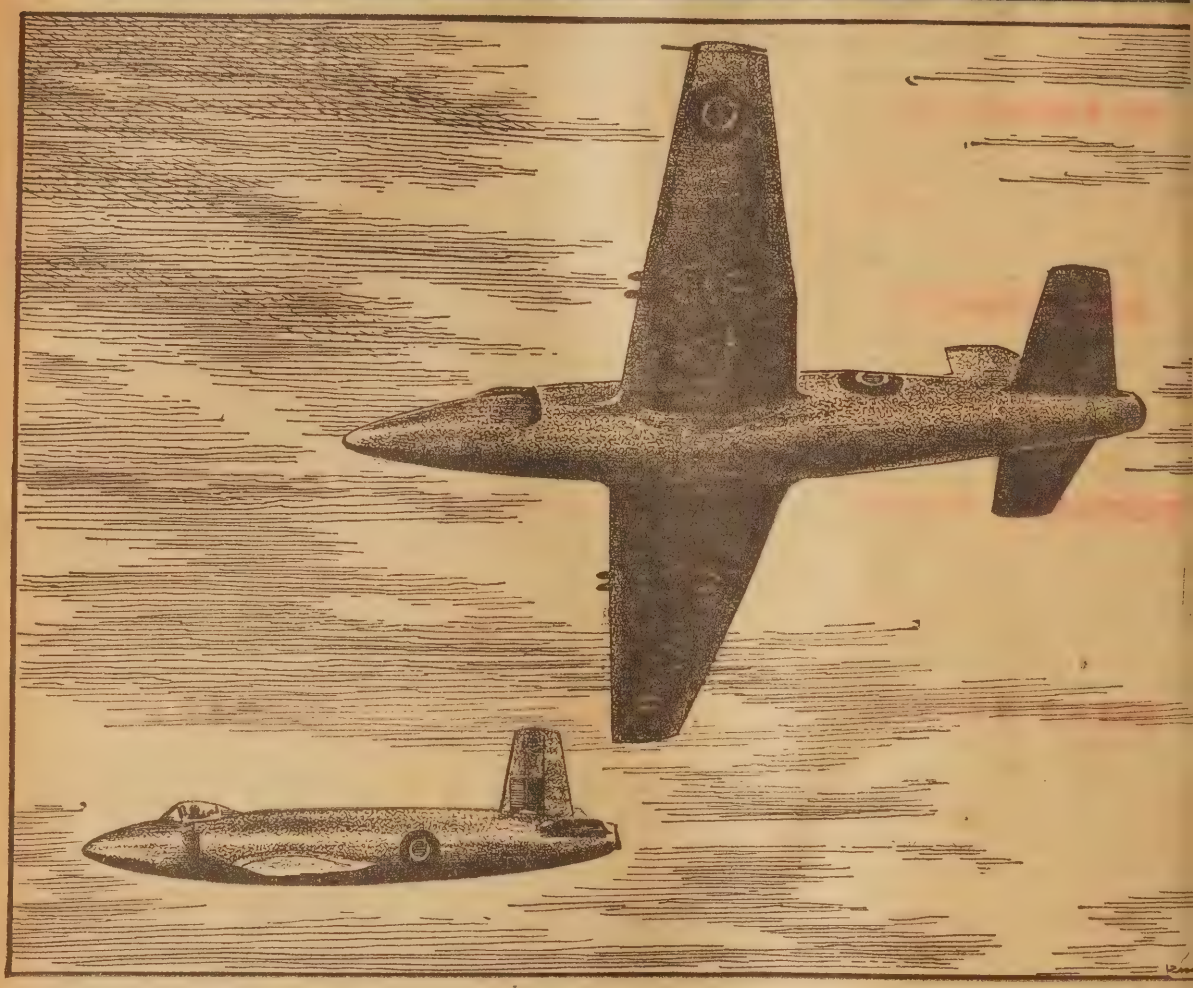
THE VICKERS-ARMSTRONG SPITEFUL



A sleek new single-jet monoplane, Vickers-Armstrong's Supermarine E.10/44 Spiteful, is one of Britain's latest day fighters.

THE Spiteful is the latest descendant of the famous Spitfire family, but is powered with a Rolls-Royce Nene turbo-jet unit. The Nene develops a thrust of 5000lb., making it one of the most powerful motors yet devised.

This new, high-performance single-seater is of metal structure throughout. The surface of the plane is finished to glass smoothness.

The nose portion of the fuselage is tapered finely. It is of heavy construction to afford armor protection for the pilot.

Laminar-flow wing design is used, giving high aerodynamic efficiency.

An air intake is located on each side of the fuselage just forward of the leading wing edge. The internal surface of the intake ducts are designed to give the most efficient air flow to the Nene installed behind the pilot's cockpit.

The tailplane shows quite marked dihedral, while the fin is placed slightly forward.

A double tail wheel permits complete retraction beneath the jet pipe. The wide-track undercarriage and tail wheel are totally enclosed by doors when retracted.

The Spiteful's cockpit, which is pressurised, is well forward and gives an excellent view for the pilot.

In the event of danger, the pilot can eject himself by means of an explosive charge beneath the seat.

SPEED 600 M.P.H.

The plane is reputed to have a speed of at least 600 miles an hour. Experts have declared that the plane has particularly good handling qualities.

Armament consists of four 20 mm. Hispano guns.

An extra-fuel tank carried externally can carry 270 gallons in addition to the normal capacity of 310 gallons.

The Spiteful's main dimensions are: Wingspan, 36ft. 11in., and length, 37ft. 6in.

MICROWAVE LANDING SYSTEM

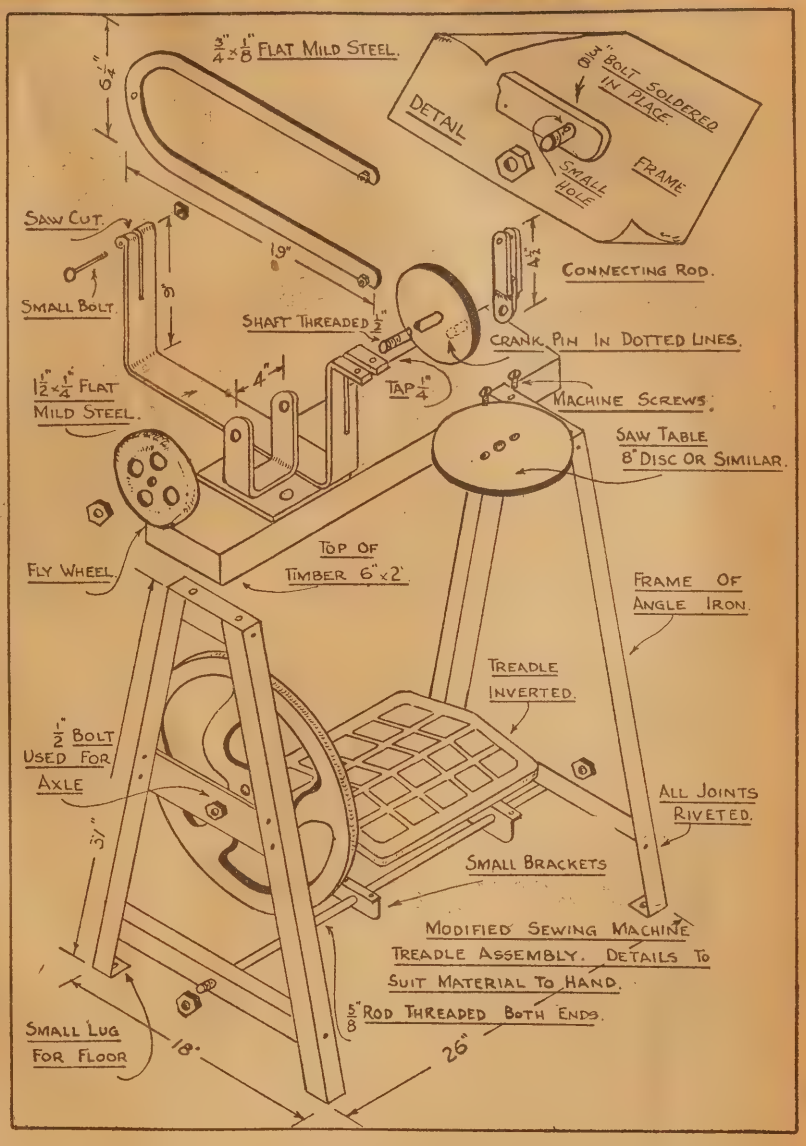
MICROWAVE landing syste developed by Sperry Gyrosco Co., has passed preliminary Army a Navy tests. It is designed to meet future Air Transport Association r quirements. Heart of the system a the electronic automatic pilot, aut matic control approach, and the omn directional beacon. The beacon tran mits, to plane and control centr facsimile maps for weather, navigatio and approach information. It is accu ate to plus or minus 1 deg. in dire tional position, ¼ mile up to 24 mil in distance measurement.

Similar to ILS, the system us micro-wave transmission in preferen to vhf. Microwaves are unaffected atmospheric or ground condition Static and radio interference are a sent; a relatively small antenna necessary.

★ ★ ★

Nicotine is one of the most toxic all drugs and acts with a rapidi comparable to cyanide.

JIGSAW MADE FROM ODDS AND ENDS



In the beginning it must be stressed that most of the parts are made of scrap and odds and ends, so individual designs will have to vary somewhat in the details. However, this should not affect the general principles, and if ordinary care is exercised the saw must work.

The frequency with which projects requiring the use of a jig saw are described has no doubt made many readers wish they had such a machine. In this article is given a description and the necessary instructions for making a treadle driven jig saw which can easily be built by the amateur using a minimum of tools and requiring a small knowledge of machine tool design. With care the saw will deal with soft woods up to one inch in thickness. The best type of saw to use is the small loop coping saw blade.

In general, the machine is divided into two main parts, the sawing head and the treadle frame. Let us begin with the sawing head, which in this case was built about a discarded wheel from a sewing machine. This proves an excellent part here, for it is fairly heavy and also has a grooved pulley-wheel attached, which will take a round 5/16-inch leather belt. These flywheels are usually about six inches in diameter, so this size will determine the dimensions of the two U-shaped supports, one to hold the shaft and the other to hold the sawing arm frame.

MAIN SUPPORTS

These supports can be made from 1½in x ¼in flat mild steel or similar, and if the metal is heated a surprisingly neat job can be made of the ends. One piece fourteen inches long is wanted for the shaft bearings. After cutting it to length measure in five inches from each end and put a centre punch mark. Now heat the metal in a fire and when red hot hold in a strong vice and bend to shape. The top edges can be rounded, if desired. The bearing holes are ½in, and are drilled after the bracket is bent to shape.

The sawing arm outrigger is also of 1½in x ¼in flat mild steel, and is about thirty-nine inches long. Start on one end and heat the metal and bend about ½in of it back along itself. This makes a double thickness, and a ½in hole will be drilled through this to take the sawing arm pivot pin, made from a small ½in bolt. Measure along the metal nine inches from the centre of this hole and put a punch mark. Then come a further eighteen inches, and again nine inches, and put two more punch marks. Heat the metal and bend it in these three places to the required shape. Be careful to keep the bends square, otherwise the frame will not be true. A glance at the sketch will give a general idea of what is required.

The next stage calls for some rather heavy hack sawing, for two slots, one in the back and one at the front, must now be cut. The one at the back is about three inches long, and the one at the other end to this is about five inches long. These cuts might have to be made longer in the final adjustment. Keep them in the middle of the metal and as straight as possible. They will have to be cleaned up carefully with a file to make them smooth and a full 1-8in in width.

These slots form the guide pieces for the sawing arm. Next is needed a six-inch square piece of flat ¼in plate, to which the bearing bracket and the sawing arm bracket are joined. If possible, it is best to weld these in position, but, failing this, rivets will serve for the present purpose. The bearing bracket should be fixed back about three or four inches from the front of the sawing arm bracket and at right angles to it.

by T. E. Le Sueur

MODEL RAILWAY ENTHUSIASTS

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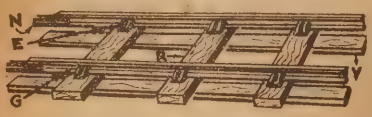

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The flywheel assembly comes next. The crankwheel consists of a six-inch disc of ¼in mild steel. Drill two 3-8in holes in this, one right in the centre and the other about ¾in from the centre. This will give a throw of 1½in. Tap both of these holes ¼in whitworth, as well as threading the hole in the centre of the sewing machine flywheel the same. The shaft is a piece of ¼in round bright mild steel, about six inches long, and threaded ¼in whitworth at both ends. Screw one end into the crankwheel, pull up tightly and rivet over the end. A shorter piece of the same material is screwed into the crankwheel to form the crank pin. Also rivet this in place, making sure that the crank pin and shaft are parallel and at right angles to the wheel. Push the shaft through the bearing holes to see if it spins freely and true.

SAWING ARM

The sawing arm is made of ¾in x 1-8in flat mild steel. About four feet is needed. Heat the centre section till red-hot and carefully bend on edge around a five-inch mandrel, making sure that the frame is kept flat. It may be necessary to reheat the metal several times while doing this. When bent and trued so that the arms are 6¼in apart from outside to outside, cut them to a length of about nineteen inches. You can test this measurement first if you like by placing the frame temporarily in position.

Three ¼in holes are drilled, one in the centre of the bend and the other two in the ends of the arms. The first serves as a pivot bearing, and the other two have to be tapped 3-8in whitworth. In these are screwed small pieces of 3-8in rod, previously threaded and drilled with a 1-8in hole to take the small coping saw blade. Rivet and solder these in place, making sure that the two 1-8in holes are in line with each other. Later, the blade is held in place with two 3-8in nuts and washers.

Make a simple connecting rod by riveting and soldering three pieces of ¼in. x 1-8in. mild steel or brass together as shown in the diagram. Drill a ¼in. hole for the "big end" and ¼in. holes for the other bearing. This end of the connecting rod fits over the sawing arm which has a small hole drilled through it to take a ¼in. pin.

ASSEMBLY

Push the shaft and crank into place and screw on the flywheel. Put the sawing arm in position and attach the connecting rod to it. The big end can be worked gradually on to the crank pin. Rotate the flywheel to see if all is well. A little oil will make it run more smoothly. All is well if when the flywheel is given a sharp turn the machine continues to run for several revolutions.

The sawing table is made from an eight inch disc or similar about ¼in. thick. Mark out three holes, one dead centre and the other two ¼in. from either side of this measuring along the diameter. Drill the centre 3-8in. and the other two ¼in. Countersink the ¼in. holes. Through these latter small countersunk machine screws will pass into two holes tapped ¼in. Whworth in the top bracket of the sawing arm frame.

Fasten the sawing table in pla and a small coping saw blade can fitted to the frame after first cutti off the loops. Pass the blade er through the small holes and screw the nuts and washers. Test the pc ition of the sawing table to see it is at right angles to the blade. A adjustment can be done with th washers placed under the sawing tab If an electric motor is available should be possible to use this to dri the saw provided some form of spe reduction is used.

Unfortunately not every craftsm possesses an electric motor so for the the next job is to make the treac frame. The frame is made from t triangular shaped sections bolted t gether at the top on to a piece 6in. x. 2in, and with a threaded 5-8 rod at the bottom, using suitable strt if desired. For the triangular e frames the angle iron from an o bed frame is utilised. Each end r quires two pieces 32½in. long for t legs (note the folded lug for faste ing to the floor), one piece seventee inches long for the bottom spread and one piece six inches long for t top spreader. These are cut to leng with a hack saw and after drilling t necessary holes, are riveted togeth with ¼in. rivets. When constructir the two ends make sure to get bo exactly the same shape.

TREADLE ASSEMBLY

The treadle assembly is modified fro sewing machine parts. The treadle i self is from a normal machine. had to be turned upside down to e able the drive wheel to be used on t left hand side. Two small bracke made from angle iron are bolted the treadle and if 5-8in. holes a drilled in these they make the bearir pieces. The drawings give an ind cation of this. Two 1-8in. holes a drilled through the 5-8in. rod ju outside the position of these bracke so that split pins can be used to sto the treadle sliding along the rod.

The drive wheel is also from a sew ing machine. Enlarge the centre ho to fit a ¼in. bolt which will be use as an axle. The type of wheel neede is one with a crank pin attached direct ly to the wheel, not one driven fro the U-shaped crank shaft. The ¼i axle is passed through a hole in piece of flat steel 2in. x ¼in. and welde in place. The whole is then rivete to the frame in a suitable positio It will be necessary to use a fille piece made from pipe to fit over th axle and so prevent the drive whe from bumping on the frame. Loc nuts hold the wheel in position.

A connecting rod for this part ca be made from wood or built up fro metal parts. This will present n difficulty. Take a length of 5-16i round leather belt and pass it aroun the drive wheel. Slide the sawin head up and down until it is direct over the drive wheel, then mark th position of the holes which will tak the bolts to hold it in place. Fi the treadle frame firmly in place o the floor and the saw is ready fo use.

MAKING AN ELECTRIC TABLE LAMP

The finished lamp fitted with a plastic shade.

JUST THE THING FOR YOUR BEDSIDE TABLE

How often have you set out to buy a table lamp but have not seen just the thing you wanted. Actually it is quite easy to make such a lamp, and there are a number of ways in which you can work in your own ideas of design. Either a home-made or a ready-made shade can be used—some of the latter are most attractive and finished in a variety of different ways.

☆

' desired, a rather neat, simple, in- expensive shade can be made at ne from modern floral wallpaper d wire. The method employed is straightforward and the results so ective—as can be seen in the illus- tion, Fig. 1—that you will probably ide to make your own lampshade. plastic shade is, naturally, more nsparent than the paper type. The que glow from the home-made de is quite pleasing, nevertheless, you might prefer it.

E COLUMN

distinctive feature about the lamp he column. This was made from in. by 3 7-8in. square-cut cabriole- ped wooden foot which the writer ppened to have in his possession. e foot saved a great deal of trouble, ause it was only necessary to alter toe slightly and remove the ngs" from the sides as shown in . 1.

t is quite likely that you may be e to purchase one of these small from a woodworkers' supply shop. only a turned cabriole leg can be ained, it will be excellent for the pose, the wings being the only ts to remove. If, on the other d, you are unable to obtain either e of foot, the only course is to pe the column, squarely, from a k measuring 6in. by 2⅜in. by 2⅜in.

It is merely a matter of pencilling the shape on two sides of the block, then cutting roughly to shape with a bow-saw and trimming and paring neatly to the guide lines with a gouge and chisel, finally smoothing the shape with a spokeshave, rasp and glass-paper. If you possess a lathe, a suitable column, based on the design shown, can be easily turned, including the base, the latter being turned solidly from a block 6in. by 6in. by 1 7-8in.

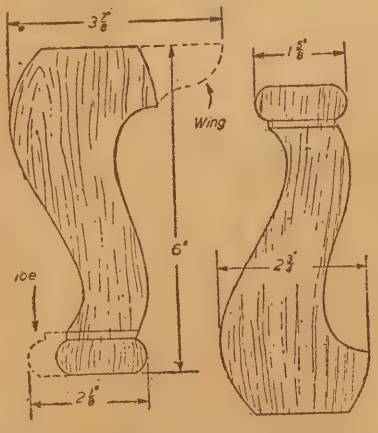

Fig. 1—How the column is shaped from a wooden foot. It is only necessary to alter the toe and remove the wings.

Assuming you manage to obtain a foot like the one depicted or a round-shaped type, it is bored down the centre for the lead cable (standard twin flex), using a ¼in. bit. Prior to drilling the hole, obtain the lamp holder shown in Fig. 4. It is a switch-bar type for pendant (hanging) or table lamp (inverted) use.

Now, in the normal way, this fitting, with the nipple screwed out, screws upon a threaded brass fitment screwed to the top end of the column. Since this brass fitting may be difficult to obtain, the actual nipple supplied with the holder can be utilised. A neat seating, therefore, for the nipple is bored in the top of the column, following which the flex hole is bored, working carefully from both ends of the foot. It is imperative that the boring is accurately done, because, as will be seen by the sectional side view in Fig. 3, the leg shape rather "cuts" into the centre of the leg.

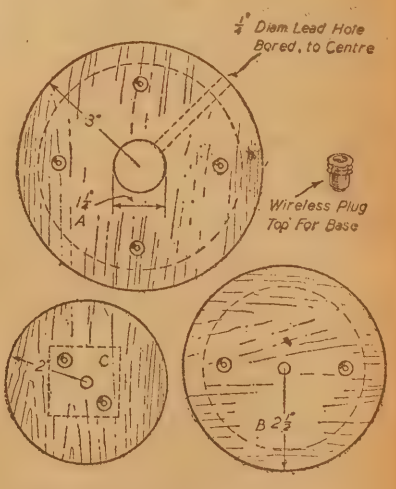

Fig. 2—Size and shape of the three base discs, which are screwed together so that the grains run crosswise to each other.

The nipple seating is begun with a ¾in. bit to a depth of 1-8in. The remainder is bored with a 3-8in. bit to a depth of 3-8in or ½in. Much depends on the size and shape of the nipple you are supplied with; the use of calipers will determine the diameter of bits to use. Should your bits make a seating which is a trifle too large, remember that the nipple can be smeared with plastic wood and pushed gently into its seating; in this case no glue will be needed.

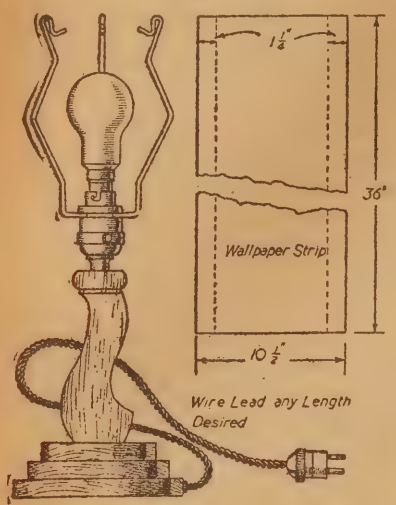

Fig. 4—A side elevation, showing lamp and shade holder in place.

THE BASE DISCS

The column base consists of three discs of wood cut from 5-8in hardwood, such as birch or beech. If you have made the column from deal, then the base discs can be cut from the same kind of wood, using a bowsaw or a pad-saw, or a coarse fretsaw. If none of these tools is available, cut out three squares 6in., 5in., and 4in respectively with a panel saw. Scribe the diameters with compasses, then saw off the corners to the radii lines to make the squares rough octagon shapes, finally paring the wood circular on a flat block of wood with a chisel, using shoulder pressure.

ASSEMBLY OF BASE DISCS

To prevent warping, the base discs must be assembled so that the grain of each runs crosswise to the other. Select the smallest disc, C, mark the position of the bottom end of the column upon it, then drill and countersink screw holes within the guide lines (see dotted lines at Fig. 2). Disc C is affixed to the column with suitable screws.

Disc B, also drilled and countersunk for screws, is attached beneath disc A, centrally. Disc A is drilled and countersunk for four screws. In its centre a 1¼in. diam. hole is bored with a centre bit. A ¾in. hole is then bored from the edge to the central hole. This is the outlet for the flex wire. The hole can be set off by fitting the top part of a wireless plug into it.

Having attached the larger disc, this completes the wooden stand. If you have used birch or beech, it will only be necessary to apply about three thin coats of French polish to the work with, preferably, a soft mopping brush. Use a light walnut polish and allow one aplication to dry before adding another. The first coat will undoubtedly soak into the wood and raise the grain slightly. This must be rubbed down with No. 1 and No. 0 glasspaper. Give the second coat, allow to dry; if it dries rough, rub down and apply a third coat.

If the brush produces streaks, due to stiffness of some of the bristles, make a small pad from cotton wool and linen and use this for bodying-up and finishing off the polishing. The whole secret of French polishing, by the way, lies in the consistency of the polish itself. The thinner the polish, the better the ultimate finish; it may mean more applications, but results are worth it.

THE SHADE HOLDER

Rather than make a wire shade holder, the writer purchased one. It was altered at the top as shown in the side elevation in Fig. 4. The alteration enabled the shade to fit down more snugly on the holder prongs. You may care to follow the same plan.

Having prepared the holder, connect several feet of standard twin flex wire to the lamp holder. The wire, of course, is first threaded down through the column and out at the base. To prevent twisting however, the wire should be brought through the column only, then attached to the holder, the latter being screwed firmly upon its nipple, and the remainder of the wire run through the base hole. A plug, or adaptor, is connected to its free end.

HOME-MADE LAMPSHADE

If you wish to make your own lampshade it is quite likely that you will have a roll of "waste" wallpaper in the house or a cutting which will provide a strip 36in. long by 10½in. wide. While a floral-design paper is desirable, almost any design of wallpaper will serve, provided that it is not too dark.

Assuming a strip of suitable paper has been obtained, cut to the size mentioned and fold it over at the edges to make 1½in. hems. These hems do not need to be pasted down.

When the hems are folder over

Materials Required

- 1 column block (or foot)—6in x 2⅞in. x 2⅞in.
- 1 top base disc (C)—4in. diam. x ⅝in.
- 1 centre base disc (B)—5in. diam. x ⅝in.
- 1 bottom base disc (A)—6in. diam. x ⅝in.
- 1 switch-bar lamp holder, with nipple.
- 1 wireless plug top.
- 1 yd. or more of standard twin-flex cable.
- 1 wire lampshade holder.
- 8 iron flathead screws, 1¼in. x 6.
- 1 strip of wall paper, 36in. x 10½in., and some stiff brass wire.
- 1 pearl, or frosted, lamp, 50 watt or 75 watt.

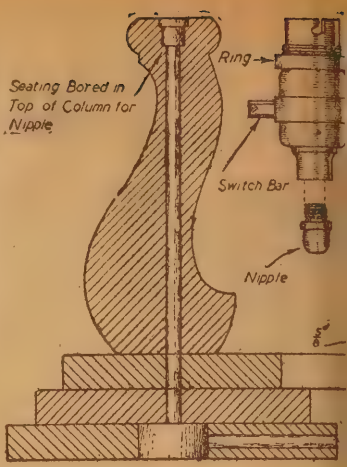

Fig. 3—Sectional view of base an column, and detail of lamp fitting use

(at the reverse side of the paper) next stage is putting a crinkle in paper. A neat way to do this is to half of a folding 3ft. rule.

The paper is set beneath one the sections (which is lifted pressed down on the paper), then crease made, following this up clos with additional creases, all being ab 5-8in. wide and bent in concert fashion.

When the paper is completely crea make two wire rings. One of these (top ring) measures about 4in. in d meter; the other (the bottom ri measures about 10in. diameter.

ATTACHING WIRE RINGS

The ends of the wire are connec with tubes of tin about 1in. long. Th tin jointers, which resemble shoe-l tags, fit tightly over the end of wire, the opposite end being kept f at the moment, this applying to e ring.

At this juncture the shade crink are drawn neatly together, then h pierced through centrally with hems, using a bradawl. This, of cou makes a hole in every crease. Keep the paper crinkles held flat togeth insert the free end of the wire ri through the paper, then connect wires together with the tin jointers.

The bunched paper is arran around the rings so that the ed meet, and these are joined toget with tube glue, thus completing shade. The diameter of the wire ri plus the variation afforded by crinkles in the paper, enable the pa to "fan" out without trouble.

To make the shade more attract a silken fringe could be sewn to bottom hem of the paper, at the terior. This could be done on a s ing machine prior to inserting the w rings.

The top ring rests upon the tips the wire holder. The latter will h to be adjusted adequately to ens a good fit. To complete the lamp 6in. disc of green baize, with a 1 hole in the middle, is attached to underside of the base with a suita adhesive. This covers the screw he and prevents the base from scratch polished surfaces.

THE VIBRAGRAM SEVEN VALVE SET

(Continued from Page 29)

ove and below a flat base plate measuring 5½in. by 3¾in. The component can be completely wired up, ving three leads only for connection to the rest of the receiver, mely, B-plus, 6-volt input, and the nmon earth return lead.

A long brass bolt is passed through ch corner of the assembly plate and cured in place, with the end of the lt protruding downwards. The four lts pass through holes in the bottn of the vibrator shield box, and e plate is held clear of the bottom the box either by suitable distance ces or by extra nuts screwed on the long bolts.

OUNTING

The same bolts are used to lock the brator box to the main receiver assis, but they should be insulated ctrically from it. One of the crets of eliminating vibrator hash to have the vibrator supply earthed the main chassis only at some point here interference is least noticeable. For this reason, large clearance les should be drilled through the assis to allow the four long bolts to ss through. The bolts can then be sulated from the chassis by bakelite shers or rubber grommets. The ommets provide some measure of echanical insulation as well, but they n perish or chaff through, and posly allow interference to become apent.

We actually used the female portion four insulated pin jacks, which rved the purpose very well. The brator socket was shock-mounted on e base plate with the aid of small bber grommets, and this provided the mechanical insulation necesry to prevent hum being heard outde the unit.

The components which should be cluded in the vibrator box are shown side the dotted shield in the circuit agram. The remaining filter comnents are mounted beneath the ain chassis and below the vibrator x. Don't try for any short-cuts in aking the vibrator supply and wiring e filter circuits. Treat every lead suspect for interference, and you ll save yourself much trouble later.

The leads to the A battery should no longer than necessary and run very heavy cable. Heavy duty ree-core cab-tyre flex can be used, th two of the leads wired in parallel reduce resistance. Bond the negave lead to chassis and use this as e earth return point for the filaent and vibrator circuits.

OSITIVE TERMINAL

Terminate the positive lead at an nchor point nearby and shield the ngth of lead running across to the f-on switch. It may be just as well so to shield the positive leads runng across to the vibrator box and the filament filter system. Note at the RF chokes in the low tension rcuit should be of the low resistance pe, likewise the iron-cored filament choke. The high tension filter chokes can be of conventional pattern.

Two 500 mfd. electrolytic condensers minimise hum in the filament circuit, while the third is connected part-way along the filament series network.

Much more could be said about vibrator supply problems, but space is at a premium. We suggest that you refer back to the December and January issues, last, and to other articles on the subject. What we said in connection with the Vibra Five receiver is essentially true of this one.

Having completed the set, check everything over and, in particular, the filament circuit. Plug in all the valves, connect aerial, earth, speaker and batteries and switch on. All being well, you should be able to feel a slight vibration from the vibrator supply and hear a hum in the speaker. In fact, stations should come through in the "Radio" position, and touching the pickup terminal in the "pickup" position should produce a healthy howl in the loudspeaker.

LOUDSPEAKER

The loudspeaker, by the way, should be of modern design. This set will justify the expenditure necessary for a new 12-inch permagnetic job. Don't spoil it by operating into some old-fashioned speaker, no matter how much affection you may have for it. Old prewar magnets just do not have "what it takes."

Anyhow, having got the set into operation, alignment is the next job. We can't launch into a full explanation of this, but the following are the steps to take:

1.—If you have an oscillator, align the IF transformers to 455 kc. Otherwise, leave them alone for the time being.

2.—Tune the receiver to a signal on the high-frequency end of the broadcast band and peak the aerial and RF trimmers.

3.—Tune in a low-frequency broadcast signal and peak either the aerial and RF cores, or the oscillator padder, whichever is provided.

4.—Set the dial-pointer so that it corresponds with the calibrations at the low-frequency end of the broadcast band.

5.—Re-tune the set to the high-frequency end of the band and bring it to line with the calibrations by shifting the oscillator trimmer. Then peak again the aerial and RF trimmers.

6.—If you have not previously aligned the IF transformers, peak them now on a weak signal.

7.—Switch to short-wave, tune to the 16-metre band, and peak the short-wave aerial and RF trimmers, preferably on background noise.

8.—Tune to the low-frequency end of the band and adjust the aerial and RF iron cores, or the oscillator padder, if either are provided. Not all coil

(Continued on Page 74)

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SHORT WAVE NOTES BY RAY SIMPSON

NEW STATIONS YOU SHOULD HEAR

PEAK RECEPTION PROVIDES NEW STATIONS FROM ALL CONTINENTS

Receiving conditions are really excellent at the present time and even seem to be improving as the winter progresses. July looks like being a DXers' dream come true as all continents are being logged on one band or the other.

STATIONS which have been inaudible during the summer and autumn months are now coming through at increased strength each week. This applies more especially to the Central and South Americans and some of them are really first class listening both in the early morning and at night.

STATION LISTS

FOR some months now we have been considering cutting out the station list which we have published regularly since our first issue. Our reason for this is that to a large extent it is duplicated every month and thus takes up a lot of space which could be used to better advantage. Space being at a premium we have therefore decided to eliminate it as from this issue.

CALL BOOK

VERY soon now we hope to publish our call book and in it we will publish a complete list of the world's short-wave stations. This will be a much better reference than our former monthly lists and each month after its publication we will include in Radio and Hobbies a list showing all additions and deletions from the call book list. Listeners will thus be able to keep their call book up to date during the year and have at all times a means of checking on all stations likely to be heard in this country. Until the call book is on sale, readers should retain their old copies of Radio and Hobbies and use the lists in conjunction with information given in these notes.

FLASHES FROM EVERYWHERE

MOZAMBIQUE.—Our latest advice from the Radio Club of Mozambique states that programmes in English are now radiated over CR7BV 4900kc. and CR7AB 3490kc. daily from 2 am till 8 am daily, and on CR7BE 9580kc. from 5 pm to 10 pm Sundays. On Monday morning CR7AB and CR7BV open at 1 am. Readers will note the new frequency for CR7BE but unfortunately it will be very hard to hear this one. Other Mozambique stations now operating are CR7IB on 7155kc. and CR7IC on 3498kc. Both these stations operate as follows: Sunday, 7 pm to 10 pm; weekdays from 7.45 pm to 8.45 pm and 4 am to 6 am (latter transmission Monday excepted).

BRITISH HONDURAS.—For many years past the writer has been trying to log the Government-owned short-wave station in this Central American colony and although a few years before the war a station was heard which was thought to be it, no verification arrived. It now appears however that this elusive station ZIK2 which uses 10,600kc. and is located in the capital, Belize, is again on the air daily with English news broadcasts from 4.30 am till 4.45 am. We have tried for it but could not hear a sound. Perhaps some other readers may be more successful. This station does verify reports with quite a nice card so it is well worth trying for especially being a new country to most of us.

JAMAICA.—Readers will remember the writer's recent reception of VRR5 on 12,050 kc. and we now learn from the latest issue of Radio News that Cable and Wireless Ltd. are also operating VRR4 on a frequency of 11,595kc. in relays, of Soccer matches taking place at Savannah Park. As we stated previously, these events were originally broadcast by ZQI on 4700kc. and the normal times this station is on the air are shown as 7 am to 8.30 am while the other outlet is 2330kc. operates from 10.30 am till 1 pm. Keep a watch on VRR4's frequency on a Sunday morning around 7 and you may be lucky enough to log this West Indian.

VERIFICATIONS RECEIVED

THE following readers have received cards or letters verifying their reception of various short-wave stations:

Mr. H. Stevenson. VLA6. Mr. J. S. Hepburn. PCJ. KU4Q, HER5.

Mr. R. Holland. VLB. Mr. R. F. Boyle. VUD8, KRHO, Singapore.

Mr. G. Oates. KRHO, PCJ, VLG9, KU5Q.

Mr. A. Cushen. CR7BJ, VUC2 6010kc., OLR2A, OLR4A, Warsaw, YV1RV, Leipzig 9720kc., VLA1O, VLA7, Singapore, 15,275kc. 15,300kc., WWV 20mc, 25mc., 30mc., CS2WI WLWO 1179kc., WLWL 9700kc., 21,650kc., HJCAB, XEHH.

Miss Sanderson. Luxembourg, XTPA, SBP, PCJ, CR7BU.

Mr. J. Wiseman. WLKS, PCJ 9590kc., Suva, WOOW, WCBX, KWIX, KJE8.

Mr. F. J. Smedley. HBJ, VUD1O, VUD7, Noumea, CHOL, KHRO 17,800kc., 9650kc., HER5 VLC11, VLG6, VLA1O, Nandi, Suva, KJE8, XGOA 11,830kc., WOOW 9490kc., 11,810kc., WOOC 15,200kc., WCBX 17,830kc., WCBN 15,270kc., XGOY.

Mr. M. Krumbeck. VUD9 11,870kc., Saigon 11,780kc., VLA9, CKCS, VLR, HCJB 12,450kc., VUD7 15,160kc., VLW3, VLB, WLWR 15,250kc., VLR2, Singapore 15,275kc., Noumea 6160kc., HER5.

Mr. R. O. Block. SEAC 15,120kc., HER5, VLR, VLR2, VLH4-5.

Mr. R. Holland. VLB, VLR2.

Our Own Listening Post:

XDY 9917kc., LKJ, YHN, CS2WI, CBLX, ETA 15,075kc. (1st report from Australia), HBJ, HEI2 6345kc., HEK3 7380kc., CR7BV 4873kc., Algiers 11,880kc., CFVP 6030kc., ZTJ 9870kc. (1st report from Australia), Nairobi 4885kc. (1st report from Australia), ZTJ 4373kc., ZTJ 4895kc., AFN 6080kc., WGEA 21,590kc., WLWK 9590kc., 17,800kc., KGEX 17,880kc., WGEX 17,880kc., WLWL 21,650kc., WLWO 15,350kc., VUM2 9590kc. (1st report from Australia).

DELHI ON 25 METRE

INDIA.—Another of the Delhi transmitt has been heard in the 25 metre ba operating on the new frequency of 11830 instead of the usual one of 11850kc. T is in addition to the other outlet on 11870 and it comes on the air at 10.30 pm w the news in English and closes down 10.45 pm. Call sign is VUD11.

USA.—The well-known Crosley stations h been heard on two new frequencies dur the past month, WLWR being on 15130kc. a WLWO in the Latin American service on unusual channel of 12160kc. with the sa programme as WLWS on 11710kc. WL closes at fair strength at 4 pm.

BRAZIL.—This month we have anot Brazilian station to list, ZYC8 on 9610 and located in Rio de Janeiro. The stren of this station is really phenomenal wh heard between 7.30 am and 8 am and no should have the slightest difficulty in id tifying it, as on the hour chimes are gi followed by announcement: "Radio Tam Rio de Janeiro Brazil" also their call lett ZYC8, and another call which we could decipher. From 8 am onwards, short musi items are given with advertisements between, all in Spanish but even so difficult to understand.

COLOMBIA.—A station which was he well last year, HJCAB, on 9690kc., has n been logged on a new frequency of 11755 This was first reported to us by Art Cush and we have now heard it on a Sun afternoon from just after 2 pm till closing about 2.20 pm. Unfortunately, QSD ma reception very difficult and careful tun is required to pull it in. This station operated by the Ministry of Education Bogota and we understand that they will n verify reports of reception so if you did receive one for their 9690kc. transmissi have another try with a report on their n frequency.

SHORT wave notes for the August issue of Radio and Hobbies are due on July 12. In the September issue they are due on August 9. Please send them direct to Mr. Ray Simpson, 80 Wilga St., Concord West, NSW.

NEW STATION LOGGINGS

Call.	KC	Metres	Location	Time Heard
CE8AA	5780	51.90	Santiago, Chile	9.30 pm
Nord West Rundfunk	6115	49.06	Hamburg, Germany	6.45 am
HCIGP	7875	38.10	Quito, Ecuador	9.30 pm
WXFG	8860	33.86	Adak, Aleutian Is.	5.30 pm
XGOUS-XOL2	9120	32.89	Nanking, China	10.45 pm
Batavia	9415	31.86	Batavia, Java	1.00 am
ZYC8	9610	31.22	Rio de Janeiro, Brazil	8.00 am
YDC	9690	30.96	Batavia, Java	10.30 pm
ZQP	9710	30.90	Lusaka, Northern Rhodesia	3.30 am
HJCAB	11755	25.52	Bogota, Colombia	2.00 pm
XENN	11780	25.47	Mexico City, Mexico	3.30 pm
VUD11	11830	25.36	Delhi, India	10.30 pm
WLWO	12160	24.67	Cincinnati, Ohio, USA	3.30 pm
WXFG	12255	24.48	Adak, Aleutian Is.	5.45 pm
XDA	14525	20.65	Chapultepec, Mexico	1.00 am
WLWR	15130	19.83	Cincinnati, Ohio, USA	10.15 pm
YDC	15140	19.82	Batavia, Java	10.30 pm
VLC	15200	19.74	Shepparton, Vic.	10.00 am

BEST BETS OF THE MONTH—TIME SCHEDULE

6.0 am. TO NOON

TAP—9465kc Ankara. Loud signal from this one at 6.30 am.

WLWK—9590kc Cincinnati. Excellent strength at 8.0 am.

WLWS—11710kc Cincinnati. Another good station around 9.0 am.

FZI—11970kc Brazzaville. Always a good one at 7.30 am.

Algiers—11765kc. This African is easily heard at 8.30 am.

GSB—9510kc London. This BBC station comes in well at 8.0 am.

OTC2—9745kc Leopoldville. Quite good when it opens at 8.0 am.

VLA5—15320kc Shepparton. Excellent in N. American session, 10.30 am.

VLR2—6150kc Lyndhurst. Always a loud station at 7.0 am.

NOON TO 6.0 pm.

FZI—11970kc Brazzaville. Very good around 4.0 pm.

Leipzig—9730kc Germany. On some days is fine at 3.0 pm.

WLWR—9700kc Cincinnati. A good station most days at 3.0 pm.

GSG—17790kc London. Now coming in very well at 4.0 pm.

KGEX—17880kc Belmont. One of the best on the band at 4.0 pm.

GRX—9690kc London. Excellent daily at 5.30 pm.

HER5—11865kc Schwarzenbourg. Still good Tuesday and Saturday, opening 5.30 pm.

Noumea—6160kc New Caledonia. Quite good just before 6.0 pm.

VLR—9540kc Lyndhurst. One of the best during the afternoon.

6.0 pm. to MIDNIGHT

KCBF—9700kc Delano. Very loud signal when it opens at 8.0 pm.

KWID—11900kc San Francisco. Still the loudest USA station.

KRHO—9650kc Honolulu. This mid-Pacific station excellent at 9.0 pm.

VLH3—9580kc Victoria. National programme very good nightly.

Paris—15240kc. At 11.0 pm. this French station reaches good level.

Saigon—6195kc. Becoming louder now late at night.

JKE—4860kc Tokyo. Actually better than JKD on 6015kc at 10.0 pm.

GSV—17810kc London. By 11.0 pm this Daventry outlet is very good.

YFA4—9250kc Macassar. Very good nightly at 10.0 pm.

lew Stations Logged Last Month

LASKA.—An interesting broadcast was rd recently from WXFG which is located Adak in the Aleutian Islands. When first rd, this station was operating on 12255kc und 5.30 pm but shortly afterwards they nounced they were changing frequency 8860kc, and sure enough they turned there at even better strength a few min-s later. Programme consisted of messages n personnel stationed in the Aleutian nds to their friends and relations in the . This station is known to verify so course we have sent off a report covering reception.

IEXICO.—Another new Mexican station been heard in the afternoons till closing 4.0 pm. This one is XENN on 11780kc Mexico City. It was listed in "R & H" last year as being on the air but I e had no reports of anyone hearing it e that time so it goes in as a new ion. Their slogan sounds like Radio ndial and on the hour they give five nes followed by station call letters, XEN a larga and XENN onda corta, or I uld say they give XENN as XE double N. difficulty should be had in hearing this as it is quite good by 4 pm. Another one heard is XDA in Chapultepec, 25kc., heard coming on the air at around am in parallel with XDY.

HINA.—From this country we hear many ions which seem to elude identification we were therefore very pleased to find ough listening to the DX session from lio Australia that a Chinese we had a hearing on 9123kc. was located in king and used the call XGOUS. However, complicate the matter we have recently rd from Mr. Moore in Brisbane that has heard a station on 9123kc. located Nanking and using the call XOL2. We uld imagine it is the same station, but the difference in call letters we cannot ss. Listen for it any night from around pm when Press messages are read by American.

HILE.—Our best catch for the month a new Chilean station located in San-de Chile and operating on 5780kc. new one opens at 9.30 pm with a stirring ch followed by call letters and location, news in Spanish till 10 pm when a ical programme is given which can be followed till around 10.30 pm. At time of writing we have not identified its call, but if it is adhering to its assigned frequency it should, of course, be CE578. If we find out before we go to press we will add it at the end of this paragraph. About a week after we first heard it, we had a letter from Mr. E. Moore, of Brisbane, who had also logged it but like ourselves could not catch the call letters. We both hope Art Cushen will be able to help with this one.

Since writing the above we have heard from Art Cushen, and, as was to be expected, he has identified this new station. It turns out to be CE1180 operating under the call sign of CE8AA, rebroadcasting their broadcast band station CB57. Their slogan is Sociedad Radio Nacional de Agricultura. If you check this station on 5780kc. you will find it carrying the same programme as CE1180 in the 25-metre band. Many thanks, Art, for your help as you certainly are invaluable when it comes to tracking down these South Americans.

NORTHERN RHODESIA.—Due to the difficulty so many readers experience in logging them, African stations seem to have a special appeal and we still feel quite a thrill to log another new one. We were especially pleased therefore to log ZQP on 9710kc. early one morning. At the time of our reception they were transmitting a native type programme but we understand they have an English programme which can be heard here on Sunday morning. At our location it only becomes audible around 3.45 am but is heard then till closing at 4 am. Art Cushen advises it is 2½kw. power and is supposed to have a coverage of 500 miles to serve Northern and Southern Rhodesia.

JAVA.—Stations in this country are becoming a real problem to follow as they are all over the dial now and every day or so we find a new one. One of the most interesting, however, heard recently is Batavia on 9415kc. in their special transmission to North America. This session is on the air daily till closing at 1 am and in their announcement they say that owing to the experimental nature of the transmission they would appreciate reports which should be sent to Radio Batavia, Batavia, Java. No difficulty should be found with this one as it comes in at quite good level.

On a recent Friday night we heard Radio Batavia in a very entertaining session over YDC on 9690kc. and also 15140kc. The programme was by the Candy Rhythmics and all announcements were in English. They asked for reports to be sent as the station was comparatively new and said they were transmitting the special Friday night programme in the 48, 31 and 19 metre band. For some reason or another we could not locate the 48 metre band outlet but on 9690kc. and 15140kc. they were really good. Old timers will remember that YDC used to be on 15150kc. where they were heard every night at good strength.

EQUADOR.—Our very active Brisbane listener, Ern Moore, put us on to an Equador station operating on 7876kc., and which can be heard nightly, opening at 9.30 pm. The call letters of this one are thought to be HC1CG though we understand when they verify reports they give the call as HC1GP which is probably the broadcast band call. Through not listening on this portion of the band we certainly missed hearing it sooner but when we knew of it we had no difficulty in hearing it. A religious service is given for the first half hour which is another aid to identification though being off the regular band no difficulty should be had in locating it. Later, call letters as announced are HC1GP.

GERMANY.—Mr. R. O. Black was first to bring to our notice a new station operating in Germany and using a frequency of 6115kc. Although Mr. Black lives only a couple of suburbs away from the writer, no sign of this one could be found until quite recentiy. It is now heard, however, every morning when usually dance music is on the air until 6.55 am when news in German is given. A six or seven note chime is then given, followed by station announcement, "Nor West Deutscher Rundfunk." This station is located in Hamburg, but up to the present, we have not obtained the correct address but hope to have it for the next issue.

REPORTS RECEIVED FROM OUR READERS

LETTERS and reports have been received from the following readers during the past month:

Mr. Art Cushen, Invercargill, NZ; Mr. Graham Hutchins, Radio Australia; Mr. G. Oates, Stawell, Vic.; Mr. W. R. Holland, Canterbury, Vic.; Mr. R. F. Boyle, Rockhampton, Qld.; Mr. A. O. Towns, King Island, Tas.; Mr. J. S. Hepburn, Croydon, NSW; Mr. J. Wiseman, Kew, Vic.; Mr. G. A. E. Major, Manjimup, WA; Mr. J. B. Hargreaves, Sydney, NSW; Mr. H. Mortimer, Marrickville, NSW; Mr. A. W. Kew, Bankstown, NSW; Mr. B. Furse, Townsville, Qld.; Mr. L. N. McCord, Manly, NSW; Mr. R. O. Block, Petersham, NSW; Mr. M. Herman, Sth. Yarra, Vic.; Mr. M. Dawkins, Colac, Vic.; Mr. H. Cox, Cobden, NZ; Mr. J. Malcolm, Dunedin, NZ; Mr. A. Godfrey, Dunedin, NZ; Mr. H. Stevenson, New Farm, Qld.; Mr. J. Adams, Wangoon, Vic.; Mr. H. Fitzsimmons, Nth. Fitzroy, Vic.; Mr. E. Moore, New Farm, Qld.; Mr. J. F. Fox, Dunedin, NZ; Mr. M. Foster, Mount Vincent, NSW; Chief Engineer, BBC, London, Miss D. Sanderson, Malvern, Vic.; Mr. L. Daniel, Maffra, Vic.; Mr. A. W. Harris, Benalla, Vic.; Mr. M. Krumbeck, Carlton, NSW; Mr. F. J. Smedley, Landsborough, Qld.; Mr. J. D. Harrington, Cremorne, NSW.

SOUTH AMERICAN STATIONS

AN increasing interest is being shown by listeners to the South American stations especially as they are now being heard so well, and in order to assist those who have not yet managed to log all of these stations we have compiled a general log of those that can be heard at the present time.

ARGENTINA.—The most easily logged of these are possibly LRA1 on 9690kc coming in well at 8.0 am. and also LRS on 9315kc which can be heard at the same time re-broadcasting LR4 Radio Splendid. Other stations in this country are LRY on 9455kc heard weakly at 7.30 am., and sometimes 10.30 pm., LRY1 on 6088kc, also weak, at 7.0 am., LRX1, 6120kc, weak at 10.0 pm., and LRM, 6180kc, very good nightly from opening at 8.0 pm.

BRAZIL.—The best of the Brazilians is undoubtedly ZYC8 on 9610kc, as mentioned in our new station notes. Another heard fairly well around 7.30 am. is PRL7 on 9720kc, which from 8.30 am. carries the same programme as ZYC8. The only other from this country which we have heard recently is what we think to be PRE9, on 6105kc, just audible around 7.0 am.

COLOMBIA.—A few years ago quite a number of Colombian stations could be heard but these days they seem to be confined to HJCX on 6018kc, which can often be heard at 10.0 pm, HJFK on 6108kc in Pereira, also sometimes audible around 10.0 pm, and lastly HJCAB at 11755kc, which we mention among the month's new stations.

CHILE.—More stations are heard from this country than any other in the South Americas, and best of them just now is the new one, CE8AA, on 5780kc, and the other Santiago station, CE622, both of which are fine on opening at 9.30 pm. Others are CE960 on 9595kc, always good at the same time, while CE970 on 9725kc can often be tuned in at 11.0 pm. In the 25 metre band there is CE1180 on 11990kc, giving a nice signal in the early afternoon and also around 10.0 pm. CE1190 on 11900kc, seems a little erratic of late and is sometimes missing after 9.0 pm, but then there is CE1174, from about 9.30 pm, trying hard to break through the Russian and Singapore on nearby frequencies.

ECUADOR.—The best known of the Equador stations is definitely HCJB, which can be heard nightly on 9958kc, 12450kc and sometimes also on 15115kc. As English is used to a large extent, no difficulty should be found with this one. Another Ecuador station again being heard is HCQRX on 5970kc, which comes on the air at 9.45 pm. Last but not least, is the new one reported this month. HC1CG or HC1GP, on 7875kc, which starts its day's programme at 9.30 pm, with a march followed by a religious type of music until 10.0 pm. All of the above stations are known to verify though the writer has not been able to get one HCQRX after three attempts.

PERU.—Stations in this country are as well heard as a few years ago, there is at least one which can be lo without any difficulty, and this is OA on 9395kc, which is very fine on a day till closing at 2.45 pm. Another heard at the same time is OAX4J on a r by frequency, 9340kc, though it is no loud as OAX4W.

URAGUAY.—The only two stations being heard from this South American co are CXA3 on 6075kc, which comes o fairly good strength at 8. 0 pm, and other rather better known station C which operates on 11835kc, and can be h best in the mornings around 8.0 an 8.30 am. Their slogan is El Especi which is given quite frequently.

VENEZUELA.—Quite a number of sta are now audible from this country, the being YV5RM, Radio „Venezuela, ope with the Woodpeckers' Song, at 8.30 on 4970kc. Another good one is YV5R 4915kc, opening at the same time nearly as loud. YVR1X, one of the Mara stations which uses 4800kc, is very often level, also opening at 8.30 pm, as also YV1RL on 4810kc, but which is very weaker. Still another is YV1RV on 47 another of the 8.30 pm openers but is rather weak on most nights. YV5RU 4860kc opens at 8.55 pm, but it the ha of the lot to log, and sometimes does seem to come on the air at all.

We hope the foregoing will be of assistance to those listeners who are yet too successful with these stations, w have a fascination all of their own, which the majority of experienced D.I seem to enjoy logging more than any o possibly due to the fact that they a little harder to identify, but repay the spent in listening to them by sending some very colorful verifications.

Next month we will deal in the same with the Central Americans and Mexi as they really come under the same hea We hope these little summaries will com sate for the absence of the station lists w normally show these stations.

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VERIFICATION DETAI

HERE are some details of recent verifica received by our readers and also of our own.

OLRIA PRAGUE. — The Czechoslova Broadcasting Corporation is now sen out an attractive view card as verific and also include a full broadcast sche Quite an interesting book has also received, entitled "The Czechoslovakian R in War and Revolution." Another one "Two Years of Work" and comments on Czechoslovak Economic Two-Year Plan.

WARSAW.—The Polish station verifie letter and also sends various magazines other articles, all of which are of int and well worth having.

ETHIOPIA.—A very nice letter was rec from Mr. W. H. Erholm, Technical Dir of Radio Services, verifying reception ETA Addis Ababa on 15075kc. He stated ETA was now off the air for broadca but was being used for CW working New The last paragraph of his letter reads: expect to be on the air daily soon, voice transmission in various languages which time we will advise you of com details. Thank you again for the val information you have given us and we you and your Australian friends wil constant listeners when we are on the permanently."

PORTUGAL.—A very colorful verific card was received from CS2WI in Pa Portugal. This card verified our rece when they were using 12400kc. They now using a new frequency of 12865kc a same times. This station is operate the Portuguese Radio Club, at Parede, is 13 miles west of Lisbon, and their is colored pale blue, with large call l superimposed on a map of the world. letters are in gold, and the map in which makes a very pretty card. The is all in English and they state the used is 250 watts.

CANADA.—One of the quickest ver tions we have ever received was that CFVP, in Calgary, Alberta. Our report mailed to them on 1st May, and our v cation arrived by air mail, 30th. May. verification takes the shape of a letter shows at the top that CFVP rebroadcast broadcast band station CFCN, "The of the Prairies." Quite a simple verifi but we were particularly pleased to r it, as we have tried for over 10 yea hear this station. CBLX on 15090kc sent along their usual Canada Calling The Canadian stations of CBC, are rather slow in verifying, and we are waiting for about three, which are overdue.

THE HAM BANDS WITH BILL MOORE

e International Telecommunications conference is at a stage where rmalities have taken up most of the session time, if we are to judge om a report of the Madrid I.T.C. proceedings. It will be some onths before the amateur knows how he fared in the bid for frequencies.

E news of who's who among the ama- ur representatives at the ITC-ARRL. ident G. W. Bailey, W2KH, will attend ternational Amateur Radio Union dele- . The IARU is a union of all the nal amateur radio societies, the head- rs society being the ARRL at Hartford, r the union covered 30 national ies and 40,000 members. By the use extensive ballot system, the union is olled by the vote of the majority of the er societies, except in the case of a e of constitution, when a two-thirds ity is required.

regular intervals the IARU calendar rwarded to member societies, who are sted to vote on matters therein and rd suggestions for the following cal- . Little is known of the IARU among urs, but it has operated successfully ver 20 years.

ARRL is represented by the general ger, K. B. Warner Wieh; general coun- aul M. Segal; senior assistant secretary, Buding Wibud; and technical director, e Grammer Widf.

amateurs have come across from Eng- to represent the RSGB. They are president, S. K. Lewer, G6LJ, and the al secretary, J. C. Clarricoats, G6CL. a number of amateurs will be serving fficial Governmental delegations—it's in hands now. Grammer in QST gives he complete set-up. It's worth reading.

★ ★ ★

914 CALL SIGN BOOK

-TIMER VK3BH Chas. Whitelaw pro- uced from the archives a 1914 vintage m book, called "Wireless in Australia." as published by the Wireless Institute ictoria, supported by the Wireless In- e of NSW. These wireless institutes later to amalgamate to form the WIA, e now have it constituted. The intro- n gives an insight into licensing con- s then. The only factor that hasn't ed since is the morse test at 12 per e. We would quote one section and, t for a technical term or two, it would mirable advice for any amateur today: y effort should be made to avoid inter- e. This may best be accomplished by se of the least power necessary to effective communication, by sharp , by waiting until other stations ting on the same wavelength have working, by listening in before press- ey, and by not tuning up spark with ae switching in sending position. Special for VFO users.) Experimenters stricts where there are a number of ns should refrain from operating con- sly for any length of time."

perusing the list of calls for VOT are few still active: XCA R. Allsop YG, XDM C. Maclurcan VK2CM, XDY Pike VK2JP, XABQ W. Zech VK2ACP, C. Whitelaw VK3BH, and, in the west, W. E. Coxon VK6AG. We may have missed one or two. All the above are still active, with at least 33 years of Ham radio behind them. The Q calls have varied quite a lot since then, but QRK and QSO still stand. It's a document that should be filed away for posterity

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W.I.A. NEWS

THE result of the ballot for councillors for the NSW Division resulted in the following amateurs being elected: P. Adams VK2JX, T. R. Anthony VK2TR, J. B. Corbin VK2YC, W. Dukes VK2WD, C. Hutchison VK2YP, M. Meyers VK2VN, and J. Moyle VK2JU. The results were announced at the annual general meeting held on May 23.

At a subsequent council meeting, the following office-bearers were elected for 1947-48: President, M. H. Meyers VK2VN; vice-presidents, J. M. Moyle VK2JU and P. Adams VK2JX; treasurer, D. Reed VK2DR; membership secretary, W. Dukes VK2WD; QSL officer, J. B. Corbin VK2YC; social officer, T. R. Anthony VK2TR; and UHF officer, C. Fryar VK2NP. The new State president, Morrie Meyers, is a well-known and active NSW amateur. A member of the Federal executive from 1935 to 1937, he has served the WIA in many official positions. A member of the RAAF Wireless Reserve, he was called up as an aircraftsman at the outbreak of war, and was demobbed as a wing-commander, collecting an OBE and MID during the fracas. He is at present Communications Superintendent of Qantas Airways.

The vice-presidents, John Moyle VK2JU and Peter Adams VK2JX, need no introduction. Both have been active amateurs for many years, and are well known in the technical sphere of radio in this State.

Don Reed VK2DR, the new treasurer, was secretary of the division prewar, and last year held the job of assistant treasurer. Bill Dukes VK2WD continues as membership secretary, a silent worker who does more than his share. Reg Anthony VK2TR takes over a new position as social officer. First job is to organise the annual dinner. Reg is well known as president of ERS; spends a lot of time on 20MX DX.

One could not imagine a NSW QSL Bureau without Jim Corbin VK2YC. As a chemist he mixes medicine with radio—more than a flight of fact, for the transmitter is in the dispensary. The UHF section is left to Chas. Fryar VK2NP, who spends most of his time persuading Hams to come a little higher in frequency.

The Federal Executive has been elected for the coming year. Federal president, W. Gronow VK3WG; vice-president, G. Glover VK3AG; secretary, A. G. Clyne VK3VX; members, P. Evan VK3OZ and G. W. Manning VK3XJ. These amateurs will have an important job to do during the year for the Australian Ham. They will represent them internationally through the IARU at Atlantic City, and with the department in Melbourne on regulations and policy. We should do our bit to support them by watching our actions on and off the air.

The annual meeting of the NSW Division held at Science House on May 23 was attended by 120 members plus visitors. The retiring president, W. M. Moore VK2HZ, in presenting the annual report, touched on the growth of the Division during the past year. Membership stood at 450, while 80 per cent. of these were active amateurs. In reviewing the year, the official recognition of the WIA as the body representing the Australian amateur was considered as a major event of the period. The distribution of disposal gear to members was a service rendered and one of practical benefit. The NSW winners of the 1946 DX contest were congratulated, likewise the UHF enthusiasts who opened 6MX up for interstate contacts.

During the meeting, the Federal councillor, J. B. Corbin VK2YC, presented a report on proceedings of the 17th Annual Federal Convention held in Melbourne.

The secretary of the NSW UHF section is M. Finlay VK2PW, 77 O'Connor-street, Haberfield, and inquiries regarding the section may be directed to that address. Monthly meetings are held on the second Friday of each month at Science House. Next meeting, July 11, at 8 pm.

Next monthly meeting of the NSW Division will be held on Friday, July 27, at 7.45 pm. Visitors are welcome.

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ON 6 METRES

WITH the Americans contacting OA, Peru, and the ZS's hearing PAO, we might expect it wouldn't be long before some VK appeared in the picture. That honor went to Eric Ferguson, VK3BD, ex 2BP, who contacted LU2CP at 1615 hours on May 31. The LU on Telephony started in Spanish and later tried some broken English. VK3BD has been an ardent UHF supporter for many years and will be remembered by VK2's as 2BP of Hazelbrook. It is the first two-way 6MX international contact from Australia. Ever since VK4HR put signals into KH6, Hawaii, for a brief period back in March, VK's have been looking for international contacts. Don Knock VK2NO has been heard in VE7, Canada, VK4EN, by a VU in India, and a VK2 was heard testing by a Western Australian Army station during the middle of the day. VK2LZ being active at the time mentioned. The possibility of a WAC on 6MX is fascinating. For North America there are plenty of W's, South America PZIA, OA4AE, and LU2CP, VK's for Oceania, PAOUN and PAOUM in Europe (G's are not licenced to operate on 50mc), and Asia represented by YI2CA and J9AAK, plus some ZS's for Africa —it's not impossible. The spring of 1947 and autumn of 1948 are listed as possible times, and with an extension of population on the band it becomes more than a mere

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possibility. It was not until 10MX was populated fully did anyone realise the potentialities of the band for international contacts. With so many amateurs being literally blasted off the lower frequencies the UHF's should come into their own.

PERSONAL PARS

KV4AA, ex K4AAN, with 225 watts from the DC mains, puts in a nice signal on 14005kc's. A PP parallel final draws amps from the mains.

A good effort the other evening was a VK2 who managed to fit in 56 CQ's before signing—we only listened out of curiosity, anyone else would have tired first.

2ANN of Bega announces 105 postwar countries. 2AHA is battling for the last few to attain the century.

The night owls have some competition with a "Home for Lunch Club." Quite a few are joining the "Tomato" (?) network, with some rapid crosschats on 40MX.

The new VR5 turned up on 20MX, signing VR5AP he is generally the centre of vicious attacks by Yanx VFO's.

WIBUX reports 115 postwar countries and a further 51 heard—possible 166—something for the VK's to aim at.

HSIAL has a partner these days—HSISS on 14095 kc's look under the thickest bunch of W's.

2ALX grid bias phone is very pleasant to listen to—4ZO turns in a T2 signal, sounds like VFO, but continuously variable. 2QJ has been holidaying on the North Coast, w ing 2NY at times.

QRP man 2AHM with his few watt a 10MX W.A.C. in 5 hours 55 mins. ones include ZC6, VQ4, LZ and HH. K reports S9 phone with 2.8 watts and S6 1.1 watts—definitely no need for 100 providing you can erect a few V beams

2AHM held the aerial terminal of transmitter the other day and 5NR re good signals—not recommended for above 2 watts.

40MX DX seems to be right off these A few months ago one could sneak ar word or two through holes between the p —just are not any holes these days.

VOIB, 14015 kc's, is on the lookou VK's. Has been heard from 1800 hr to 2100 hrs.

Eric ex Mobile Marine VK2ANE now G3BQH as a call sign. Wants VK cont reports getting some nice disposal through the RSGB. Nice DX in the ings include two stations from Ber VPGK 14025 kc's and VPGL 14010 Generally audible about 2200 hours.

Old VR6AA from Pitcairn Island w 14085 kc's with some 500 cycle ripp the signal—rather crowded out with Y

Visitor to Sydney was G5UB—P. Also call sign VE7ALG. He has been doin rounds of the shacks.

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A BIG BATTERY RADIOGRAM

(Continued from Page 69)

boxes have provision for alignmer the low-frequency end of the s wave band.

9.—The short-wave stations ma shifted in relation to dial calibra by varying the oscillator trimmer then peaking the aerial and RF t mers again.

For further alignment hints more detailed instructions, we su you refer to the complete articl set alignment, as given in the 1946 issue.

When the receiver is aligned, just possible that vibrator hash become evident at certain spots o dial. Get your screwdriver and earthing the vibrator case to the sis at different spots. Choose the one, and make a permanent link the aid of a couple of bolts and s lugs and a short length of copper

BYPASSING

If there is still trouble, try bypa various points in the filament work, try an additional high-te or low-tension choke, or any o other dodges suggested in the e articles.

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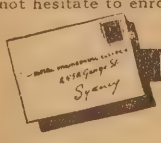

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R.H. July.

OFF THE RECORD — NEWS & REVIEWS

In the June issue appears a recording which has made something of a sensation among radio and record fans. And rightly so, for it has many of the virtues which go to make a first-class set of records.

By JOHN MOYLE

ONCERTO NO. 2 IN C MINOR, OP. 18 hmaninoff) (9 Parts), ARTUR RUBIN- IN (Pianist) with the NBC Symphony Or- tra, cond. by Vladimir Golschmann, and promptu No. 3 in G Flat, Op. 51" pin) Artur Rubinstein, Piano Solo). ED.472/6.

us concerto has always been a favorite uine, and I know my liking for it is ed by practically every music lover. It frankly romantic work (and how! I hear say) but of the highest class.

e first recording I remember was that he Philadelphia Orchestra with Rach- inoff himself as the soloist. To my mind, early recording has never been excelled a musical point of view, not even by latest Rubinstein. That is not surpris- for the composer was himself a pianist he first rank, and he knew what he nt as no other man ever did.

w concerti have been written in which piano and orchestra are so completely as Any attempt to steal the limelight on pianist's part, except in obvious cadenza- moments, completely spoils the unity and of the music. In this connection, I c Rachmaninoff himself is the only one atisfy in full. Rubinstein at times still s a little too much emphasis on the nation of the soloists—a point on which inclined to join issue with the recording panies in many instances.

binstein does not catch the full intimacy his most intimate of music in several points. In fact there are a few sections h he dismisses quite summarily which maninoff transforms into almost magical and color. The orchestra apparently s the cue from him, and fails to appre- here and there the full excursions of and shade which I feel are there.

ese, however, are super-critical matters. recording in general is an exceptionally one, and on the profit and loss account, sily the best yet issued on an all-round Technically, the others cannot com- with it. It has fullness, splendid dy- c range, and is almost universally and easy to play, although as with any ding of its sheer weight, needle wear present a problem on good machines.

e final terrific climax is well done, but side which impressed me most was the usion of the second movement. Music this is completely irresistible; one feels almost wrong for music to express so and so frankly.

ould class this set as one of the finest d this year.

NDON PHILHARMONIC ORCHESTRA, ucted by Sir Thomas Beecham—"The t Elopement" (Handel-Beecham—Parts The Pump Room; The Linleys; Hunting e; Love Scene. Parts 3-4: The Weary ties; The Plot; Sarabande; Horn Pipe. 5-6: Intermezzo; Gigue; Beau Nash; id Love Scene. HMV ED.477/9.

cham and his orchestra score another ss in this arrangement of Handel, which ub-titles describe adequately. The fiery shman has annoyed many with his out- n and autocratic ways, but even these s will concede him his due in records he above. If he has a few affectations conceits in real life, these are set aside st the complete sincerity he exhibits not in his arrangments, but in his perform- of them. You can accept these records confidence.

IO NO. 4 IN B FLAT, OP. 11" (For forte, Clarinet and 'Cello) (Beethoven) arts). DENIS MATTHEWS (Piano), NALD KELL (Clarinet) and ANTHONY ('Cello), and "ADAGIO IN G MAJOR") (Denis Matthews, Piano). COLUMBIA 338/40.

impressive collection of performers one to expect high quality playing, and precisely what we get here. As I have on other occasions, I sometimes feel oven's efforts for unconventional trios produced as much to please the players e day as for his desire to say some- for which such mediums are essential. utstanding example of this is to be in his Triple Concerto—not the most nd of his utterances by any means. music here can stand on its feet without effort. The combination is entirely acceptable, and handled with great skill and effect. The recording, also, passes with high marks. Chamber music enthusiasts and students will welcome it.

HALLE ORCHESTRA, Conducted by John Barbirolli—"Mastersingers of Nuremburg—Suite" (Wagner), 1 & 2: Prelude (Act 3) and Dance of the Apprentices (Part 1). 3 & 4: Dance of the Apprentices (Part 2); Procession of the Masters; Homage to Sachs and Finale (Act 3). HMV EB.369/70.

This is good music and good playing. The opera itself achieved something not seen elsewhere in Wagner's operas—a down-to-earth quality far removed from the fantastic and grandiose doings of the gods and heroes. It lends itself admirably to a presentation of this kind, and I enjoyed it immensely.

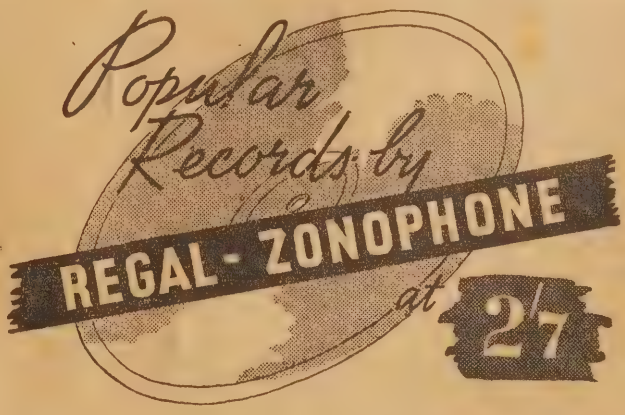
SAN FRANCISCO SYMPHONY ORCHESTRA, Conducted by Pierre Monteaux — "Images" (For Orchestra) (Debussy) — 1. Gigues (2 Parts) and 3. Rondes de Printemps (Springtime Rounds) (2 Parts). HMV ED.480/1.

If your knowledge of Debussy is confined to "L'Apres Midi," and the better known piano pieces, you will greet these with pleasant surprise. They illustrate the composer's powers much more fairly and fully, in company with "La Mer" and other similar recordings released in the past. Here we find them splendidly handled. It is essential to hear such things, and to know them, if Debussy and others in the same position are to be assessed justly and correctly.

YEHUDI MENUHIN, Violinist, Piano acc. by Gerald Moore—"Minuet" (Mozart, arr. Kross) and "Romance" (Based on a theme by Paganini) (Green). HMV EC.155.

The titles say all that can be said about these performances. They are arrangements made for films, and while they do not insult the music by any means, they lose in weight what they may gain in popular acceptance. The playing and recording are excellent.

JOAN HAMMOND, Soprano, with Philhar-



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monic Orch., cond. Vilem Tausky—"Ocean. Thou Mighty Monster" (From "Oberon") (Weber) (2 Parts). HMV EB.371.

Of this record, I can only say it is Joan Hammond at her best. May I be excused, please, if I find Florence Austral and her performance have spoiled me for those of more modest stature. You will find that Joan Hammond's voice sounds much bigger and more impressive on records than it does, at least in our concert halls. We must be fair, I think, and realise the great task she has set herself in tackling material which has made the reputations of others more lavishly equipped. It is a good recording, nevertheless, and will find many admirers.

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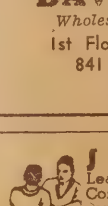

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ANSWERS TO CORRESPONDENTS

DER THE PERSONAL SUPERVISION OF THE TECHNICAL EDITOR

). (Glen Iris, Vic.) asks about the use battery charger.

/e have no intimate knowledge of harger you have on hand but from you say it would seem that it could nnected directly to your 2-volt accu- or without using an external series r. The charging rate would be quite even for your small battery. There be no need to use any series resistor filaments of the 1D4 and 1J6 as are rated to operate at 2 volts—the al voltage of your accumulator. Glad e that you enjoy reading "Radio and s."

(Nailsworth, SA) renews his subscrip- nd extends his congratulations on the t standard of "R. and H."

hanks for the subscription and we are o note that our magazine is coming your expectations.

(Wellington Point, Qld.) asks whether valve D/W "Majestic" can be adapted e stations below 13 meters.

he coil kits available now are not in- to tune below 13 meters, so that your ope of doing this would be to wire in ch and separate coils, winding coils higher frequencies. You cannot count able results beyond 30 megacycles. For ata, we can only refer you to the nunications Nine" receiver, as we can- ssibly undertake to provide special data individual inquiry.

(Darlinghurst, NSW) asks whether it isable to buy an ex-RAAF receiver for l short-wave listening, also ex-Army ulators for operation of the set.

/e have never made a close study of and Air Force Communications receivers, y of them may be satisfactory for your e provided it has the necessary fre- coverage. Make sure that you pur- a communications type receiver and st one of the transmitter-receiver com- ns operating in the band between 40 meters. As for the accumulators, they be good, bad or indifferent according ir age and the manner in which they een maintained.

(Peterborough, SA) has an Army 109 36 receiver and would like assistance uilding them to a more conventional

s you say, the "Vibra-Five" is the t circuit to your requirements and you certainly not go far wrong in follow- out in detail, using as many parts sible from the Army sets. An extra IF would boost the performance, although loubtful whether it would give you any stations at enjoyable listening level. nmediate problem about using an extra ge is how to provide for the filament, e filaments in the "Vibra-Five" just out nicely. We feel that readers are interested in dismantling disposals ent for the components they contain than adapting their design for general ng.

F. (Collinsville, Qld.) asks whether we pply him with a complete list of the wireless stations operated in outback

orry, H.E.F., but we have no such list ble nor can we suggest where you obtain it, unless it be from the PMG ment. We have not sighted the pro- new converter valve to replace the although we agree that there is cer- room for such a valve. We realise battery-operated communications type r would interest many readers, but not promise an article on the set in mediate future.

(Ormeau, Q.) renews his subscription ys he would like to see more articles rator sets.

Thanks for the subscription. We not promise any more articles on this lar subject other than are appearing me to time.

t. (Bankstown East, NSW) advises a of address, and says he was delighted recent articles on a test oscillator, grinding, and a crystal oscillator. lad to note that the articles appealed C.A.R. and we have duly noted hange of address.

F. (Sunshine, Victoria) suggests that nciple of a modulated air stream, as ed recently in "Radio & Hobbies" emonstrated about 40 years ago by arles Parsons.

orry if our article gave you the im- that the modulated air stream was invention. We have had no occasion e the history of the idea, but pub- lished the article as an instance of its recent application

A.C.L. (Elimbah, Q.) reports having converted his "1942 Pentagrid Four" circuit to the "Vibra-Four." He says that there are no hash troubles at all, and the performance excells that of many 5-valve receivers in the district.

A. Thanks for your report on this set, A.C.L., and we are delighted to know that it is operating so well. If the hash trouble disappears with the vibrator cover removed, there is no objection to operating it that way.

R.A.S. (Rabaul, New Britain) writes in appreciation of "Radio & Hobbies" and suggests that we should publish articles on antenna systems and also more news of the activities on the amateur bands.

A. Thanks R.A.S. for your letter and glad to note that you have found our circuits so satisfactory. We note your suggestion about the article on aerials and will probably have something to say on the matter in the near future.

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A.E.L. (Fremantle, WA) takes us to task for describing receivers and amplifiers with push-pull audio systems, suggesting that we would do better to devote space to equipment specifically designed to operate at low volume.

A. There are debatable points about your letter, one being your apparent assumption that a 13-watt amplifier cannot give good reproduction at a level of one or two watts. This idea is quite erroneous as, assuming equal design merit, the distortion level from such an amplifier at two watts would normally be lower than that from a much smaller amplifier operating at the same output but naturally much nearer to its overload point. The peculiarities associated with low level listening are a function of our ears and requires judicious boosting of both bass and treble. This is provided by special circuit arrangements, not the mere reduction of power output capabilities. A relevant point is that large amplifiers sometimes have a higher hum level which intrudes when they are operated at only a watt or so. Once again this is not basically a function of power output rating.

K.J.C. (Smithtown, NSW) has built up a crystal set, but finds that it will not operate at his location, which is eight miles from the nearest broadcast station.

A. We would expect a crystal set to operate at your location provided it is properly built and adjusted and that you are using it with an effective aerial and earth. Unless the factory building towers over your aerial in a way likely to shield it, reception should not be affected thereby. Remember you must have a large outside aerial and an effective earth.

W.A.H. (Mascot) sends in his subscription to "Radio & Hobbies" and says he has built the "A-C Checka-meter" successfully.

A. Thanks for your subscription and we are glad to note that you have found so much of assistance in "Radio & Hobbies."

R.J.M. (Fullarton, SA) sends in his subscription to "Radio & Hobbies" and says he would like to see more articles on model aircraft.

A. Many thanks for your subscription. We cannot promise a greater proportion of space to model aircraft just at the moment. However, interest in model aircraft seems to be building up a little now and we will certainly give the matter more attention if we sense a widespread demand for it from our readers.

A.J.T. (South Melbourne) asks whether a 255 volt transformer could be used in the "Fireside Five" receiver.

A. There would be no need to make any changes to the circuit. The high tension voltage would be a little on the low side, but not enough to compromise seriously the performance.

J.E.L. (Darlinghurst) writes in appreciation of the recent article on regeneration and sends in his subscription to "Radio & Hobbies."

A. Glad to note that the article was appreciated and your subscription has been attended to. Yes, we always advise subscribers when their subscription falls due.

S.R.C. (Hobart, Tas.) says he built up the "1946 Advance" receiver and has had excellent results from it.

A. Thanks S.R.C. for your letter and for the report on the "Advance" receiver. You have certainly done well to log over 30 stations on your "Tiny Tim 11" receiver. Best of luck with your A.O.C.P. examination. Your amplifier circuit has been filed for possible use in the "Reader Built It" page.

N.H. (Bellingen) asks about his subscription and mentions the bias arrangement in the "Fireside Five" receiver.

A. There is no need to worry about your subscription as you will be advised through the post in good time for renewal. We prefer fixed bias in some receivers because it often saves components and simplifies wiring. There is also some virtue in being able to earth all cathodes direct to chassis. We can see no point in providing variable bias in a receiver like the "Fireside Five" as it would not contribute to the gain on short-waves and would only complicate the control of the set.

HOW TO SUBMIT YOUR QUERY

1. Queries will be answered in rotation through the columns of our magazine if not accompanied by a fee for a postal reply.

2. Queries, neatly and concisely set out, will be answered by mail as quickly as possible if accompanied by 1/- in postal notes or postage stamps. Endorse envelope "Query."

3. Back numbers are rarely available but reprints of most circuits, wiring diagrams, and parts lists will be supplied for 6d each, minimum charge 1/-. Thus a circuit, layout, and parts list will cost 1/6 in stamps or a postal note. Endorse envelope "Circuit."

4. Blueprints of exact size chassis layouts with all essential holes and cut-outs will be supplied if available for 2/6. Endorse envelope "Blueprint."

Address your letters to the Technical Editor, "Radio & Hobbies," Box 2728C, GPO, Sydney.

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ANSWERS TO CORRESPONDENTS

(Continued from Previous Page)

E.W. (Moonee Ponds, Vic.) sends in an advertisement and expresses his satisfaction with the magazine.

A. Many thanks for your kind remarks E.W., and we will see that your advertisement is included.

J.W. (Dubbo, NSW) advises of his change of address and reports on his experiments with a "Majestic Radiogram."

A. Your change of address has been noted and we read with interest your remarks about the various output systems. We will probably have more to say in the future about the acoustic side of reproduction, particularly so when good loudspeakers are readily available.

A.J. (Ingham, NQ) enquires whether we have a circuit available for a valve tester capable of testing all existing types.

A. A valve tester is one instrument we have never yet described, mainly because its construction would require a lot of special components. Calibration would also present serious problems. We may tackle the job some day, but have no immediate intention of doing so.

J.H. (Collinsville, NQ) sends in his Call Sign and address for inclusion in the Call Sign book and mentions the type of equipment in use.

A. Your Call Sign has been noted for inclusion in the book. We read with interest your remarks about your own equipment. We have used a variety of aerials for 2JU, but the centre fed doublet is the one most frequently employed for the lower frequency bands.

C.J.P. (Ettalong, NSW) sends in his Call Sign and suggests that we should give attention to the auxiliary equipment for the ham "shack."

A. Thanks for the Call Sign and we note your suggestion about the equipment. We have had the matter in mind for some time, but it takes time to build up and describe equipment of this nature.

W.B.A. (Newstead, Vic.) sends in an advertisement and says he has completed several of our battery circuits with good success.

A. Your advertisement has been handled in the usual way and we are pleased to note your success with the various circuits. We can understand your keenness to become an amateur and this will certainly open up a new field of activity for you.

J.M. (Dandenong, Vic.) built the 1Q5-GT receiver successfully, but had the misfortune to burn out the filament of the valve.

A. We can only suggest that you obtain another 1Q5-GT. The 6X5-GT is generally capable of substituting for a 6Z4 with appropriate change to the socket and wiring. The idea of connecting a torch lamp in series with the B-minus lead is quite good and it does offer some protection for the valve filament and also for the batteries, should a short occur in the receiver.

E.A.D. (Wingin, NSW) reports having built up the "Long Range Battery Five" receiver, but says that the selectivity is rather poor on the low frequency end of the dial.

A. There is nothing about the circuit which would adversely affect the selectivity, this characteristic being governed mainly by the coils and IF transformers used. If these are of modern design, improper alignment may be the cause of the trouble. See that the IF transformers are peaked properly and check on the adjustment of the padder condenser or iron cores, which control the circuit tracking at the low frequency end of the band. An article on the general subject of alignment appeared in the July, 1946, issue.

D.B. (Spring Vale, Vic.) asks about the inclusion of resistors in a power supply to lower the high tension voltage.

A. The desired effect can be obtained by connecting a heavy duty resistor in series with each plate lead to the rectifier or between the filament of the rectifier and the input of the first filter condenser and choke. Resistors in either position naturally introduce a voltage drop, but also modify considerably the operation of the rectifier valve. The filter system ceases to be a conventional condenser input type so that the reduction in voltage is more than would be apparent by an Ohm's law calculation. If a 2000 ohm resistor is necessary elsewhere in the filter circuit to drop the voltage, the chances are that the same effect would be apparent with about half the resistance in either of the positions previously mentioned. The simplest method is to ascertain the needed value by experiment.

R.R. (Manly, NSW) asks several questions about the "Communications Nine" receiver.

A. A chassis blueprint for this receiver was supplied to chassis manufacturers and supplies should be available through normal trade channels subject, of course, to current shortages. A 150 mmfd condenser would serve well enough for the band set condenser except that there may be a slight gap at the low frequency end of the respective bands. A 150 mmfd condenser would be rather for the band set but you could correc by putting the tapping a little near earthed end of the coils or by stripping plates from the condenser. We sugges you use mica condensers where specif the tubular types are often less ef as high frequency bypasses. The s speaker is not at all critical, althou 8in. unit would be the usual choice.

M.O.C. (Mt. Morgan, Qld.) advises change of address and expresses his pl in reading "Radio & Hobbies."

A. Your change of address has been and we are glad to note that you fi much of interest in each issue.

A.O.T. (King Island, Tas.) asks w the "1946 Pentagrid" could be used for wave reception by using 100 mmfd condensers and plug-in coils.

A. The receiver would certainly oper arranged in this way but you could not very high sensitivity. Also it would r suitable for reception on C.W. signals w the addition of a beat frequency osci It would be a good thing if you could ar some form of regeneration in the I.F. ch to increase the gain and also promote oscillation for the reception of C.W. si Low impedance headphones could be nected straight into the plate circuit "All Wave Three" receiver and the tension voltage could be reduced at the time. The plate current should not b much for the 400 ohm phones under conditions while power output shoul ample.

I.R.K. (Drysdale, Vic.) reports having up our "Tex" receiver but says that he gets two stations at good volume.

A. It is not altogether surprising tha can only receive the two stations in vi your distance from Melbourne. After al signal pick-up on a loop aerial is quite and the receiver employes only two v Nevertheless the addition of an ex aerial and earth should improve matters siderably and many readers have give enthusiastic reports on the performan this little set. It is quite in order fo volume to diminish as the aerial is t closer to the earthed end of the coi selectivity improves at the same time, has to strike a balance between the factors to obtain best overall results. Th for your suggestion about the mantel rec

K.H. (Fitzroy, Vic.) reports having up the "Fireside Five" and says th performs every bit as well as we claim the article.

A. Thanks for your report on the se we are glad to know that it is operati well. It s strange that you are havng tr with the tone control but it may be you are wiring it the wrong way round should be wired in such a way that rot in an anti-clockwise direction deepens tone. There is no particular objectio adding the mica condenser, provided it not affect the performance adversely.

C.S. (Ivanhoe, Vic.) is anxious to o the address of amateur stations which h picked up.

A. You should be able to obtain a co the Amateur Call Sign Book from the GI your capital city for 1/6. This list Australian amateur stations. As a matt interest we are planning to turn out a si book ourselves, complete with articles of teur and short-wave interest.

R.A.W. (Portsea) is interested in the vice Oscillator" recently described and where the tuning dial can be purchased.

A. The original dial was obtained fron Manufacturers Special Products Limited Clarence-street, Sydney.

J.C.C. (Marrickville, NSW) reports h built up an auto receiver following the eral design of the set in the December, issue.

A. Many thanks for your report on set and we are glad to note that it is forming so well. However, you are very tunate that you have struck so little tr with ignition noises although the fact your car is an open type probably has s thing to do with this.

B.M.T. (Canberra, ACT) asks whethe have ever made available covers for volumes of "Radio & Hobbies."

A. We have never made available c for binding "Radio & Hobbies" and ha immediate plans to do so. However you have the volumes bound commercially i so desire. Other than the "1Q5-Two" ceiver, we have no circuits along the you request but could recommend the Wave Three," described in the April, issue. Alternatively, you may be inte in one or other of the "1K5" receivers described in current issues. Apart fr few recent numbers, we have no back of "Radio & Hobbies" in stock and car suggest that you advertise for them th our "Wanted To Buy" columns.

VANTED TO BUY, ELL OR EXCHANGE

: 1 "Palec" valve and circuit tester, odel VCB 6-volt battery operated, 1 rsity" Universal Speaker and output 1 "University" 5 band oscillator. All fect condition and appearance as new ccept £32 the lot, or sell separately. 4-valve portable set, as new, £18. s copies Radio & Hobbies, best offer. ft. Mepunga West, via Allansford, Vic.

: C.R. Tube 902, brand new, £2/5/-, ply R & H. 10946.

: 66 R & H; valves 5Y3G, 6U7G 6V6G, 7GT, 1H5G, 1N5G, perf. cond. 2 prs ear-, Emmco, Brunet 4000 & 2000 ohms, Yates, 56 Parsons St., Kensington, Melb.

: Amplion 8" P.M. 15,000 trans., £2; valve (as new), 15/-; Midget 2-gang, hroat mike, 7/6; "Survey of Superhets," R. Bell, Box 40, Jeparit.

NTED: Two power supplies for 101 or F.S.6. transceivers, particulars to W. rn, Newstead, Vic.

NTED: Urgently, Vol. 8 No. 4 Radio & Hobbies. Will sell Vol 8, Nos. 37 to 12, Nos. 1 and 3. J. Gunn, Welshpool, Vic.

NTED: Cigarette Cards. Pay 2/- complete set 50, 1/6 50 odd cards. Clean V. Nethway, Box 36, Burra, S.A.

NTED: Portable receiver any condition. Will exchange for two 2 valves battery D. Denis, Carlton House, Casino, NSW.

NTED: Urgently, Rola 10-42 permag, peaker. State condition and price. L. Ridgelands, via Rockhampton.

NTED: Recently advertised Philips push-utton tuning assembly, complete with Write stating price to J. Lowe, 2 n St., Cooks Hill, Newcastle.

NTED: Radio "Wizard" mike, case only, nace by Newman Stern Co., Cleveland, on market 8-10 years ago. Price to 3, Carwarp, Victoria.

NTED: Radio and Hobbies for April, May, June, September, 1942, and November, four shillings a copy. J. S. Coomer, 535 ghby Road, Willoughby, N.S.W.

NTED: B. and C. eliminator, working der, leads and plugs, operating and ser-nannual for No. 19 transceiver. Price to nont, Sydney St., St. Mary's, N.S.W.

NTED: Gramophone records wanted, any condition, Russ Colombo, Bing, Bob , Art Shaw, Dorsey Bros., Rudy Vallee, Austin, Ray Noble. Postage, freight good prices, send titles for sale. J. es, 14 Hargrave Street, Semaphore, S.A.

NTED TO BUY: Kingsley A.R.7 receiver good order and condition—VK3SE— Widgery, 703 Macarthur St., Ballarat, ia.

(Continued on Next Page)

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ELECTRO AND PERMAG. LOUDSPEAKERS

I would like to build up the "X" receiver, which requires a 2000 ohm electrodynamic loudspeaker. I can buy a permagnetic speaker and would like to know what changes are necessary in the circuit to accommodate it. This is a very common question in our mail just now.

THE field coil of an electrodynamic speaker is normally used as a filter choke in the power supply system and the d-c current flowing through it serves to energise the magnet assembly of the speaker. The exact d-c resistance of the field coil depends on the design of the receiver, but a value of 2000 ohms is common for four and five valve sets. Larger sets generally use a lower value field, either 1500, 1000 or 750 ohms.

A fairly substantial voltage drop occurs across the field coil—generally around 100 volts—and this loss is compensated in the original design by using a transformer and rectifier combination to deliver the required high tension voltage, plus the voltage drop across the field coil.

When there is no field coil to provide for, the normal procedure is to replace the field in the circuit with a filter choke of adequate current rating. However, most filter chokes have a d-c resistance of only a couple of hundred ohms, and the mere substitution of a filter choke for the field coil is unsatisfactory. The d-c voltage drop across the choke is much less than that across the field, so that an excessive high tension voltage is likely to be applied to the receiver.

The danger of this can be eliminated by connecting a heavy duty resistor "R" in series with one lead to the choke, the value being selected so that the net d-c resistance of choke and resistor is similar to that originally specified for the field coil. This is shown in circuit (a).

If need be, an extra 8 mfd. electrolytic condenser can be connected from the junction of resistor and choke back to high tension centre tap to afford extra filtering.

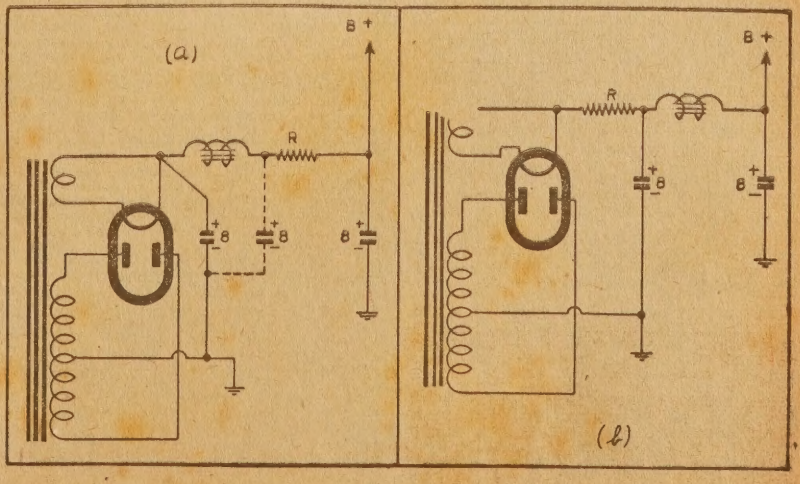
In some cases it may be adequate merely to replace the field coil with a resistor of the same d-c resistance. Its filtering efficiency will be below that of the field coil, but substitution of 16 mfd. condensers for the usual 8 mfd. units will help to keep the hum level within reasonable limits.

It should be noted that the resistor in the filter network must carry a heavy current, so that nothing less than a 20-watt unit should be used for the purpose. It should be mounted well in the clear, so that heat radiated from it will not adversely affect other components in the set.

An alternative arrangement is to insert the resister "R" between the filament of the rectifier and the first filter condenser, as shown in circuit (b). This has the advantage of reducing the peak voltages on the filter condensers, but it is difficult to calculate the required value. Since the filter circuit is no longer a true condenser input type, the initial voltage is reduced. Therefore, resistor "R" may be only half the value it would be if connected directly in series with the choke.

It should be rated at 20 watts for safety, the exact resistance value being selected experimentally to give the required high tension voltage on the receiver proper.

Readers should also refer to an article in the November, 1945, issue covering transformer specifications for sets and amplifiers using permag. loudspeakers. If a transformer is used with secondary rated at, roughly, 100 volts less than required for a high resistance filter system, then a filter choke can be substituted directly for the field coil, without other addition or change to the circuit.



WANTED TO BUY, SELL OR EXCHANGE

FOR SALE: A one-valve set, good order, with audio trans., batteries, less phones, £4. G. Briant, 61 Hannah St., Beecroft.

FOR SALE: Power transformer 500 x 500v 250 M.A. filter choke to suit, also 83 rectifier. Forrest, 20 Wilberforce Ave., Rose Bay.

FOR SALE: Little Jim's Mate—complete with cabinet, phones and new batteries, £5. J. Martin, 16 William St., Armadale, SE3, Vic.

FOR SALE: One three-phase 24v. synchronous motor, £2. 84 Crinan Street, Hurlstone Park, Sydney, N.S.W.

FOR SALE: "R & H" "Springtime Portable" cabinet, new, 36/-. Write R. Clegg, 38a Sutherland Street, Cremorne.

FOR SALE: 465kc. Crystal, mounted, as new, half price at £2/10/-. Bedgood, Oceana St., Dee Why, N.S.W. Phone XW8324.

FOR SALE: Brand new factory tested 5BP1 cathode ray tubes, £5 ea. V. J. Yalden, 267 Victoria Ave., Chatswood.

FOR SALE: 1 valve receiver (1P5CT), parts all new, plus headphones and new batteries, £6/10/-. Freight paid. M. Tricarico, Silvan, Victoria.

FOR SALE: "Little General" 1946 D.W. radio, £15 or best offer C. Dawson, 128 Three Chain Rd., Solomontown, South Aust.

FOR SALE: Sunbeam Shavemaster Electric Razor, 32 volt A.C./D.C., complete with transformer for 240 volt. Best offer, C. F. Ryan, 57 Tebbutt St., Leichhardt, N.S.W.

FOR SALE: Complete set "Applied Electricity," new, £15 or best offer. Apply E. J. Stanke, 31 Bertha St., Mt. Gambia, S.A.

FOR SALE: No. 11 set, complete with LP & HP units, also aerial, tuner, guaranteed perfect condition. Complete, £15. Holmes, 96 George St., East Maitland.

FOR SALE: New University multimeter in polished wood carrying case, £7. Valves 2 47, 1 79, 6C8-G, 6U7-G, 5Y3-G, 80 at 8/6 each. D. Godfrey, 136 Parramatta Rd., Auburn.

FOR SALE: Public address system, inc. Philips radio receiver mic. amp. gramophone. 8 speakers suit factory, £100. JA6259.

FOR SALE or Exchange. 7 valve Strom. Carl. dual wave radio console. P.P. output. Excellent on D.X., £20, or will exchange for good sewing machine. W. J. Phelps, 15 Cheviot St., Ashbury, UA4751.

FOR SALE: 1 6-volt vibrator amplifier, 12 watt O.P. complete with new speaker and crystal pick-up, nice tone, Hi-Fi unit, price £20. Write for details. D. F. Bowditch, Canyon-Leigh P.O., via Moss Vale.

FOR SALE: R & H "Amateur Junior" in cabinet, less speaker and phones, 240 V.A.C. (ECH 35 convertor) with coils for 10in. & 20in. Wanted to buy or exchange for another tube a metal 6J7. Write R. Anderson, Shepparton, Vic.

FOR SALE: Amplifier 13 watt 7 valve, suitable for public address or dance band use. Complete with D104 microphone, 3 speakers 500 ohm line from 2A3's output, £29. R. Everett, 48 Cooloongatta Rd., Camberwell, Vic.

FOR SALE: 1 slightly used A.C. operated model R.O.M. "Healing" oscillator and multivibrator, in new condition. Bargain at £18 or best offer. A. Moffatt, Bridge St., Uralla.

FOR SALE: 8 Single Gang Condensers 2/6 ea.; 10 A609, UX201A, type valves and 7 inch dynamic spkr. (slightly damaged) 15/-; or exchange for 2 455Kc IF's and Permag. Spkr. J. Adams, Wangoom, Vic.

FOR SALE: 4 valve amplifier speaker, pick-up, motor, in cabinet, with microphone and stand, together with 100 modern records. Suitable for parties, &c. Best offer. Particulars from K. Camps, Quirindi, N.S.W.

FOR SALE: 1 6in. permag. speaker, 1 60 mill P.T., 1 1-gang cond., 10 assorted 1.4 volt and 2 volt valves all test over 80 per cent., £4/10/- the lot. M. W. Peacock, 219 Ascot St., Ballarat, Vic.

FOR SALE: English 19 complete 15 valves, £10. Porcelain 9 pin EF50 sockets, 4/9. Freq meter 1 to 10 megs, £8. 101 transceiver, new with power supply, £7. 23 Doomben Ave., Eastwood. WL1186.

FOR SALE: Transreceivers. British, S.R.3 Mk. II., 3.1 to 15.5 mcs. 97-250 V.A.C., 6 V.D.C. operation. AR108 Mk. II., also American link. 10 valve 30-40mcs. E. M. receiver. 16 Stanhope Rd., Killara, Sydney. JX1734.

Readers wishing to buy, sell or exchange goods are invited to insert an advertisement on this page. The cost is 9d. per line; minimum charge 2/3. Approximately 6 words to a line. Advertisements for the next issue must reach our office by WEDNESDAY, JULY 16. Dealers' advertisements not accepted.

FOR SALE: 5in. Dyn. speaker, Yaxley 3-bank, 3 pos. SW. 60ma. Tranny R.F. osc. aer. coils, 14-42 metre, genemotor 24v.-250v., 4-IFS, 70/-. Airzone 5v mantle D.W., £12½. 4v new portable, £14 or offers. 1A Hercules St., Brighton, N.S.W.

FOR SALE: One 2-valve (1Q5) radio, perfect condition, batteries, phones, £6/10/-. Quantity old type battery valves, loudspeakers, E. Tata slide rule, English spotlight with batteries. Apply K. Howard, 4 Edith St., Cessnock, N.S.W.

FOR SALE: R & H 1946 Amateur Junior Six valve receiver, complete with separate B.F.O. valve and 6in. P.M. Speaker. Any reasonable offer accepted. H. Dege, Holmes St., Leura, N.S.W.

FOR SALE: "Duplex Single"—1 valve set using 1D8G-T complete with batteries and headphones, £4/10/-. Calstan Multitester for circuit and valve testing, £7/10/-. R. B. Grant, 2 Gentle St., Lane Cove, JB2869.

FOR SALE: Two 906 cathode ray tubes, almost new, £3 each. 1 Stromberg "H" 3 gang tuning condenser, 25/-, 1 5in. electro-dynamic loud speaker, 1500 ohm field, 30/-. B. J. Yalden, 267 Victoria Ave., Chatswood.

FOR SALE: Six amplifiers, outputs up to 30W, 2 direct coupled 3½ and 7W. With or without speakers and covers University M.V.A. multimeter with case, new, £8/15/-. Also D.C.M. multimeter, £4. Call or write Butler, 75 Henry St., Windsor, Melbourne.

FOR SALE: 1 four-valve portable in leatherette cabinet with door, less a 1D8-GT valve, complete otherwise, cost £23. Best offer. Also "University" multimeter model M.V.A. New six months ago, £9/10/-. Gale Bros., Fish Creek, Sth. Gippsland, Victoria.

FOR SALE: Philips receiver No. 4, perfect order, covers 1.2 to 20 megacycles, works off 6-volt battery or 240 A.C., works speaker and phones, ideal amateur receiver, price £35 or near offer. Two No. 11 high and low tension generomotors, £1 each. M. Darwen, William St., Rosewood, Queensland.

FOR SALE: F.S.6 Transceiver S/W and B/C 6 volt vibrator operated, spare vibrator, Have installed "Rola" Speaker also 1L5G output making 6 valve receiver and 3 valve transmitter complete. Telescopic aerial and circuit diagrams. Nearly new. A gift at £22. T. Couch, 715 Sydney Rd., Brunswick, Victoria. FW1811.

FOR SALE: Home recorder with cutting head, good condition, £10. Royce Recording Turntable, almost brand new, two-speed, £12. Shure 508B Microphone, brand new, bargain, £13. Ellipsoid Microphone, £3/5/-, and 6-foot Microphone Stand, £2/10/-. J. Longman, 7 Zadoc St., Lismore.

FOR SALE: 1D8GT new, 25/-. Eliminator and 2VACC, £1. .0004 S.G. Condenser, used once, 5/-. EL3WG, used once, 10/-. Lit. Gen. chassis, 3/-. Reinartz coil, 3/-. Leatherette cabinet and DA7 dial, 17/6. 5in. Amplion Speaker, 2500, 17/6. 2 pr. headphones, 2000 ohms 15/- pr. 90 Asquith St., Auburn, N.S.W.

FOR SALE: Two permagnetic speakers, one 8in. 13,500 ohms, 15/-. One 5in. 8000 ohms, 30/-. One red cabinet for R & H portable, 25/-. Six 6-pin coil formers, 9/-. Complete kit parts for R & H 3-valve portable, mounted on chassis, less speaker and 1 valve, £5/10/-. One A.J.S. multimeter in 11in x 10½in. x 5in. cedar case, £6. All S.H., but in perfect order. Apply D. G. Heron, Box 180, Bowen, Queensland.

FOR SALE: Newnes Complete Engineer £5, good as new. Meccano set with clockwork motor, £3, cost 85/- English. 32 R & H from Feb. '43 to April '45. 18/- sent. Write for details above with offers. R. Turner, "Homeleigh," Stanley Terr. Taringa, Qld.

FOR SALE: University Meter movement I.M.A. metal rectifier, some switches unused. Also 40 watt soldering iron, dozen valves. Excellent pair roller skates. G. Byrne, 3 Augusta St., Concord. UF2208.

FOR SALE: Philips A.B.C. power pac A.C./D.C. valves, 4 volt 2 variable densers, drum dial, £5 the lot or offe Fal'din, 168 Manon St., Leichhardt.

FOR SALE: Amplion Speaker, 8in 250 F.C. 30/-. Coil unit 10/-. 1D8GT valves 30/- each. Posted. Write or call "Radio, 223 Crown St., Sydney.

FOR SALE: Little General Mantel B.C complete, unused. All new parts, quality including 5in. A.W.A. Speaker. tractive cabinet. What offers? S. H. shire, 11 Chalmers Rd., Strathfield. UM

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SALE: Paton M.C.A. multimeter, 4 cu 4 voltage, 3 resistance ranges, A Perfect condition. Complete with leads Hill, 43 Boulevarde, Cammeray, N.S.W.

SALE: Pathe 240v 9.5 Projector, motor d complete with films, also camera. Re overhauled by Heron & Smith Ltd. £2 outfit. T. Donoghue, Monaro St., Queanb

SALE: Hammarlund Super Pro. Parts, chassis, switch unit; gang, 18 coils, £ the lot, 5 gang cond., 12/6; 1Q5 (new) R. Bedford, 7 The Corso, Parkdale, Vic

SALE: Communications Receiver (M.C new, with power pack, A.C. or D.C., E. Clark, 6 McMillan St., Maffra, Vic

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SELL: A.W.A. 101 Com. set (converted) wave A/C, perfect, best offer. B 19 Onslow Ave., Elizabeth Bay, Sydney

SELL: Practically set books on elect and radio, 8 Vols. and blue prints. edition, as new, £15 or best offer. M. Co 93 Islington Rd., Kilkenny, S.A.

SELL: Bargain, 2 valve set complete earphones and batteries (1Q5-2), Freight paid. W. J. Younger, 287 Wy Rd., Norman Pk., S.E.1., Brisbane.

SELL: One valve set (19) complete cabinet and headphones, less batteries Rola SC permag. speaker, £1. R. Wa 22 McDonald St., Mackay.

SELL: Valves 1F5G, 1M5G, 1K5G, EB 6U7G, 2 ea. 6C6. All in good order, the lot or 10/- each. D. A. Kalwig, 59 ridge St., Glenelg, S.A.

SELL: Recording apparatus, Royce moto overhead gear, mechanoid cutting transformer, head phones and playback up, £25. New Ellipsoid mike and floor £6/10/-. McDonald, 5 Lucas St., Caulfield

SELL: New valves, two type 43, one 25L 12/6 each. Also prewar Little G cabinet, mottled effect, cond. perfect. R. Clark, 83 Chiswick Rd., East Banks N.S.W.

SELL: Signal generator, A.W.A., freq. to 27mc., output 0.1 microvolt to 0.1 1st class, condition, £35. J. E. G.I.R.E., 482 Chapel Rd., Bankstown, Phone UY1809.

SELL: Amplifier, 13 watter, compact pi mike inputs with Dynamike, 12/20 Speaker, A.G.E. 240v. Gramo Motor, Table, valves 12B8-GT, 30, 6A6, 1N7-GT, 01A, 2-1A7-GT, 2-49. Part used. Chea Birkley Road, Manly, N.S.W. Phone X